NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JANUARY 1988

(NASA-SP-7039(32)-Sect-1-Abst) NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 32) (NASA) 61 p CSCL 05B

N88-15732

Unclas
00/82 0118986

ACCESSION NUMBER RANGES

Bibliography Number	*STAR Accession Numbers*
NASA SP-7039(04) SEC 1	N69-20701 - N73-33931
NASA SP-7039(12) SEC 1	N74-10001 - N77-34042
NASA SP-7039(13) SEC 1	N78-10001 - N78-22018
NASA SP-7039(14) SEC 1	N78-22019 - N78-34034
NASA SP-7039(15) SEC 1	N79-10001 - N79-21993
NASA SP-7039(16) SEC 1	N79-21994 - N79-34158
NASA SP-7039(17) SEC 1	N80-10001 - N80-22254
NASA SP-7039(18) SEC 1	N80-22255 - N80-34339
NASA SP-7039(19) SEC 1	N81-10001 - N81-21997
NASA SP-7039(20) SEC 1	N81-21998 - N81-34139
NASA SP-7039(21) SEC 1	N82-10001 - N82-22140
NASA SP-7039(22) SEC 1	N82-22141 - N82-34341
NASA SP-7039(23) SEC 1	N83-10001 - N83-23266
NASA SP-7039(24) SEC 1	N83-23267 - N83-37053
NASA SP-7039(25) SEC 1	N84-10001 - N84-22526
NASA SP-7039(26) SEC 1	N84-22527 - N84-35284
NASA SP-7039(27) SEC 1	N85-10001 - N85-22341
NASA SP-7039(28) SEC 1	N85-22342 - N85-36162
NASA SP-7039(29) SEC 1	N86-10001 - N86-22536
NASA SP-7039(30) SEC 1	N86-22537 - N86-33262
NASA SP-7039(31) SEC 1	N87-10001 - N87-20170
NASA SP-7039(32) SEC 1	N87-20171 - N87-30248

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by RMS Associates.

NASA SP-7039(32)
Section 1
Abstracts

NASA

PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in *Scientific and Technical Aerospace Reports (STAR)* between July 1987 and December 1987.

Scientific and Technical Information Division 1988
National Aeronautics and Space Administration
Washington, DC

This supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, price code A04.

INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

The *NASA Patent Abstracts Bibliography (NASA PAB)* is a semiannual NASA publication containing comprehensive abstracts and indexes of NASA-owned inventions covered by U.S. patents and applications for patent. The citations included in *NASA PAB* were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

For the convenience of the user, each issue of *NASA PAB* has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in *STAR* since 1969. Thus a complete set of *NASA PAB* would consist of the Abstract Sections of Issue 04 (January 1974) and Issue 12 (January 1978) and the Abstract Section for all subsequent issues and the Index Section for the most recent issue.

The 136 citations published in this issue of the Abstract Section cover the period July 1987 through December 1987. The Index Section references over 4700 citations covering the period May 1969 through December 1987.

ABSTRACT SECTION (SECTION 1)

This *PAB* issue incorporates the 1987 *STAR* category revisions which include 10 major subdivisions divided into 76 specific categories and one general category/division. (See Table of Contents for the scope note of each category under which are grouped appropriate NASA inventions.) This new scheme was devised in 1975 and revised in 1987 in lieu of the 34 category divisions which were utilized in *PAB* supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a *STAR* citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned to *STAR* to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

Abstract Citation Data Elements: Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

NASA Accession Number
NASA Case Number
Inventor's Name
Title of Invention
U.S. Patent Application Serial Number
U.S. Patent Number (for issued patents only)
U.S. Patent Office Classification Number(s)
(for issued patents only)

These data elements are identified in the Typical Citation and Abstract and in the indexes.

INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes. These indexes are cross-indexed and are used to locate a single invention or groups of inventions.

Subject Index: Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Inventor Index: Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Source Index: Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Number Index: Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the Accession Number.

Accession Number Index: Lists all inventions in order of ascending Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible with the flexibility incorporated into the *NASA PAB.*

(1) *Using Subject Category:* To identify all NASA inventions in any one of the subject categories in this issue of *NASA PAB*, select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

(2) *Using Subject Index:* To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (i) use the Subject Category Number to locate the Subject Category and (ii) use the Accession Number to locate the desired invention within the Subject Catgory listing.

(3) *Using Patent Classification Index:* To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

TYPICAL CITATION AND ABSTRACT

ON MICROFICHE

NASA SPONSORED

ACCESSION NUMBER → **N87-15253*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. ← CORPORATE SOURCE

TITLE → **WEIGHTLESSNESS SIMULATION SYSTEM AND PROCESS**
Patent Application

INVENTORS → HUBERT C. VYKUKAL, inventor (to NASA) 29 Oct. 1986 14 p

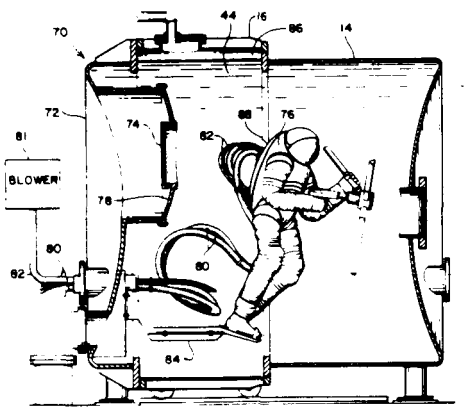
NASA CASE NUMBER → (NASA-CASE-ARC-11646-1; NAS 1.71:ARC-11646-1;
US-PATENT-APPL-SN-924398) Avail: NTIS HC A02/MF A01 ← PRICE CODE

US PATENT APPLICATIONS SERIAL NUMBER → CSCL 14B ← AVAILABILITY SOURCE

COSATI CODE →

A weightlessness simulator has a chamber and a suit in the chamber. O-rings and valves hermetically seal the chamber. A vacuum pump connected to the chamber establishes a pressure in the chamber less than atmospheric pressure. A water supply tank and water supply line supply a body of water to the chamber as a result of partial vacuum created in the chamber. In use, an astronaut enters the pressure suit through a port, which remains open to ambient atmosphere, thus supplying air to the astronaut during use. The pressure less than atmospheric pressure in the chamber is chosen so that the pressure differential from the inside to the outside of the suit corresponds to the pressure differential with the suit in outer space. NASA

← ABSTRACT



KEY ILLUSTRATION

TABLE OF CONTENTS

Section 1 • Abstracts

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) N.A.

43 EARTH RESOURCES AND REMOTE SENSING N.A.

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION 35

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

45 ENVIRONMENT POLLUTION N.A.

Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS N.A.

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY N.A.

Includes weather forecasting and modification.

48 OCEANOGRAPHY N.A.

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL) N.A.

52 AEROSPACE MEDICINE 36

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES N.A.

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 36

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY N.A.

Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 37

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE N.A.

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS 37

Includes computer networks and special application computer systems.

63 CYBERNETICS N.A.

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS N.A.

Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY N.A.

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS N.A.

Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS N.A.

Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

For related information see also *Engineering.*

70 PHYSICS (GENERAL) 37

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

Note: N.A. means that no abstracts were assigned to this category for this issue.

Section 2 • Indexes

JANUARY 1988 (Supplement 32)

NASA Patent Abstracts Bibliography

A Semiannual Publication of the National Aeronautics and Space Administration

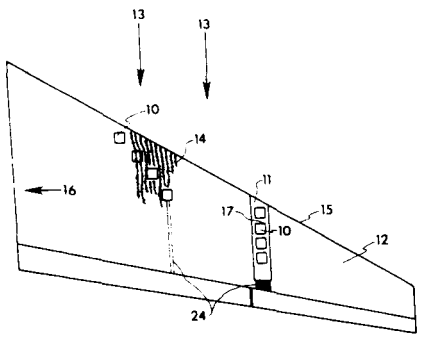
02

AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

N87-23587*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CROSSFLOW VORTICITY SENSOR Patent Application
BRUCE J. HOLMES, inventor (to NASA), DEBRA L. CARRAWAY, inventor (to NASA), HARLAN K. HOLMES, inventor (to NASA), and THOMAS C. MOORE, inventor (to NASA) 15 Jan. 1987 14 p
(NASA-CASE-LAR-13436-1-CU; US-PATENT-APPL-SN-003676) Avail: NTIS HC A02/MF A01 CSCL 01A

A crossflow vorticity sensor for the detection of crossflow vorticity characteristics is described. The sensor is comprised of crossflow sensors which are non-invasively adhered to a swept wing laminar surface either singularly, in multi-element strips, in polar patterns, or in orthogonal patterns. These crossflow sensors are comprised of hot-film sensor elements which operate as a constant temperature anemometer circuit to detect heat transfer rate changes. Accordingly, crossflow vorticity characteristics are determined via cross-correlation. In addition, the crossflow sensors have a thickness which does not exceed a maximum value h in order to avoid contamination of downstream crossflow sensors. NASA



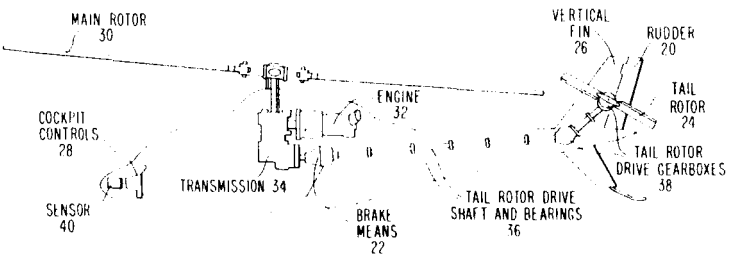
05

AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

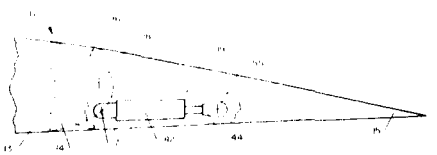
N87-24460*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HELICOPTER HAVING A DISENGAGEABLE TAIL ROTOR Patent Application
HENRY L. KELLEY, inventor (to NASA) and JOHN C. WILSON, inventor (to NASA) 23 Apr. 1987 14 p
(NASA-CASE-LAR-13609-1; NAS 1.71:LAR-13609-1; US-PATENT-APPL-SN-041387) Avail: NTIS HC A02/MF A01 CSCL 01C

A helicopter is provided with a tail rotor which can be braked within a predetermined range of speeds, and stopped and locked at a predetermined speed. The helicopter includes a tail portion having a vertical fin extending therefrom. The vertical fin has a rudder movably attached thereto and the tail rotor is rotatably attached to one side of the vertical fin. The braking and stopping of the tail rotor can be performed automatically or manually from the cockpit. A brake and clutch system is provided in a main portion of the helicopter and controls the tail rotor. The rudder becomes operative when the tail rotor is slowed, stopped and locked so as to provide fine control of the helicopter especially at high speeds. Thus, the helicopter can fly at higher speeds without incurring aerodynamic loads thereon which occur at high speeds. In addition to the reduced noise from the helicopter with the tail rotor stopped, the safety of the helicopter, especially when boarding and deplaning passengers during emergency situations, is increased. NASA



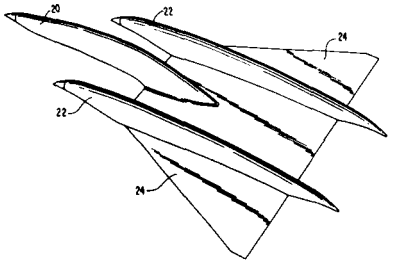
N87-24461*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPROVED CONTROL SURFACE ACTUATOR Patent Application
GERHARD E. SEIDEL, inventor (to NASA) (Boeing Co., Renton, Wash.) 23 Mar. 1987 10 p
(NASA-CASE-LAR-12852-1; NAS 1.71:LAR-12852-1; US-PATENT-APPL-SN-028832) Avail: NTIS HC A02/MF A01 CSCL 01C

A device which actuates aircraft control surfaces is disclosed. The actuator is disposed entirely within the control surface structure. This allows the gap between the wing structural box and the control surface to be reduced. Reducing the size of the gap is especially desirable for wings with high aspect ratio, wherein the volume of the structural box is at a premium. NASA



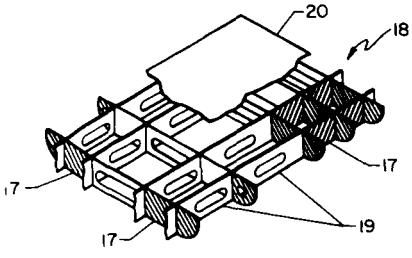
N87-25320*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A MULTI-BODY AIRCRAFT WITH AN ALL-MOVABLE CENTER FUSELAGE ACTIVELY CONTROLLING FUSELAGE PRESSURE DRAG Patent Application
RICHARD M. WOOD, inventor (to NASA) 12 Feb. 1987 16 p
(NASA-CASE-LAR-13511-1; US-PATENT-APPL-SN-013801)
Avail: NTIS HC A02/MF A01 CSCL 01C

A multi-body aircraft with an all-movable center fuselage which translates relative to two side fuselages is described. At subsonic and transonic flight the center fuselage is in a forward position. At supersonic speeds the center fuselage moves aft so as to ensure optimum aerodynamic interference at particular Mach numbers. This provides an increased shock strength and greater surface areas so the significant reductions in zero-lift wave drag can be achieved. This concept allows for a significant increase in the wing aspect ratio which would improve high-lift performance at all speeds without incurring a significant supersonic zero-lift wave drag penalty. In additions, an improved low-fineness ratio, high-speed performance is achieved at all speeds and for all flight conditions. NASA



N87-25321*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTEGRALLY-STIFFENED CRASH ENERGY-ABSORBING SUBFLOOR BEAM STRUCTURE Patent Application
GARY L. FARLEY, inventor (to NASA) 19 May 1987 12 p
(NASA-CASE-LAR-13697-1; US-PATENT-APPL-SN-051426)
Avail: NTIS HC A02/MF A01 CSCL 01C

An integrally-stiffened crash energy-absorbing subfloor beam is disclosed which provides increased energy absorption efficiency and ease of fabrication while uncoupling the design parameters for energy absorption and structural stiffness. The invention comprehends a beam web integrally stiffened by an assembly of vertically oriented tubular stiffeners, interconnected by vertical flat plates and top and bottom beam caps. The tubular stiffeners are of arbitrary cross-sectional shape. Typical materials for the beam are any ductile metallic (aluminum) or non-metallic materials or fiber reinforced composite material (Graphite/Epoxy and Kevlar/Epoxy). A subfloor structure is built by arranging the beams into a grid or latticework configuration such that the flat plates between the tubular stiffeners are oriented vertically. A rigid floor surface is attached over this grid of beams to complete a lower fuselage structure. NASA



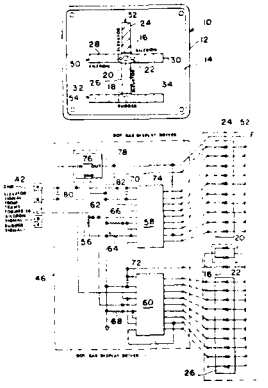
06

AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

N87-22678* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRCRAFT CONTROL POSITION INDICATOR Patent
DALE V. DENNIS, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) 5 May 1987 9 p Filed 8 Feb. 1984 Supersedes N84-20522 (22 - 11, p 1607)
(NASA-CASE-LAR-12984-1; US-PATENT-4,663-627; US-PATENT-APPL-SN-578387; US-PATENT-CLASS-340-975; US-PATENT-CLASS-73-178-R; US-PATENT-CLASS-244-1-R; US-PATENT-CLASS-340-945; US-PATENT-CLASS-340-971)
Avail: US Patent and Trademark Office CSCL 01D

An aircraft control position indicator was provided that displayed the degree of deflection of the primary flight control surfaces and the manner in which the aircraft responded. The display included a vertical elevator dot/bar graph meter display for indication whether the aircraft will pitch up or down, a horizontal aileron dot/bar graph meter display for indicating whether the aircraft will roll to the left or to the right, and a horizontal dot/bar graph meter display for indicating whether the aircraft will turn left or right. The vertical and horizontal display or displays intersect to form an up/down, left/right type display. Internal electronic display driver means received signals from transducers measuring the control surface deflections and determined the position of the meter indicators on each dot/bar graph meter display. The device allows readability at a glance, easy visual perception in sunlight or shade, near-zero lag in displaying flight control position, and is not affected by gravitational or centrifugal forces.
Official Gazette of the U.S. Patent and Trademark Office



08

AIRCRAFT STABILITY AND CONTROL

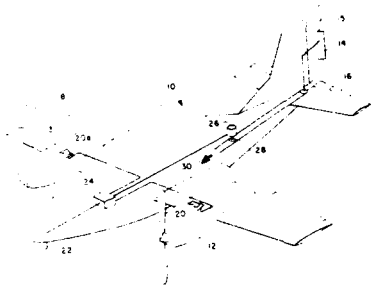
Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N87-20999* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRPLANE AUTOMATIC CONTROL FORCE TRIMMING DEVICE FOR ASYMMETRIC ENGINE FAILURES Patent
ERIC C. STEWART, inventor (to NASA) 10 Mar. 1987 7 p

Filed 23 Oct. 1985 Supersedes N86-20397 (24 - 11, p 1720)
(NASA-CASE-LAR-13280-1; US-PATENT-4,648,569;
US-PATENT-APPL-SN-790556; US-PATENT-CLASS-244-76-R;
US-PATENT-CLASS-340-967) Avail: US Patent and Trademark Office CSCL 01C

The difference in dynamic pressure in the propeller slipstreams as measured by sensors is divided by the freestream dynamic pressure generating a quantity proportional to the differential thrust coefficient. This quantity is used to command an electric trim motor to change the position of trim tab thereby retrimming the airplane to the new asymmetric power condition. The change in position of the trim tab produced by the electric trim motor is summed with the pilot's input to produce the actual trim tab position.

Official Gazette of the U.S. Patent and Trademark Office

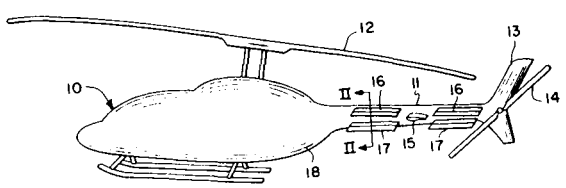


N87-23630*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

HELICOPTER ANTI-TORQUE SYSTEM USING FUSELAGE STRAKES Patent Application

HENRY L. KELLEY, inventor (to NASA) and JOHN C. WILSON, inventor (to NASA) 30 Jan. 1987 14 p
(NASA-CASE-LAR-13630-1; US-PATENT-APPL-SN-008895)
Avail: NTIS HC A02/MF A01 CSCL 01C

This invention relates to helicopters, and particularly to the improvement of the helicopter torque control system. At low to medium forward speeds helicopter performance is limited by the effectiveness of the means for counter-acting main rotor torque and controlling sideslip airloads. These problems may be overcome by mounting strakes on the aft fuselage section. For single rotor helicopters whose main rotor rotates counter-clockwise as viewed from above, one of the strakes would be mounted in the upper left hand quadrant and the second in the lower left hand quadrant. The strakes alter the air flow around the fuselage by separating the flow so as to produce lateral air loads on the tail boom which oppose main-rotor torque. The upper strake operates in a right crosswind to oppose main rotor torque, and the lower strake has effect in left crosswinds. The novelty of this invention resides in the simple and economical manner in which the helicopter tail boom may be modified by the addition of strakes in order to increase torque control, and reduce the need for supplemental mechanical means of torque control. NASA



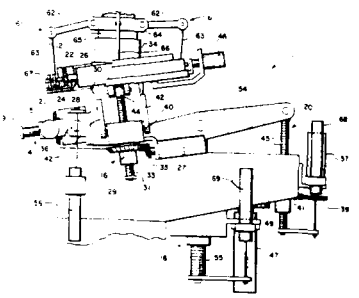
N87-23631* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SWASHPLATE CONTROL SYSTEM Patent

RICHARD J. PEYRAN, GEORGENE H. LAUB, and H. ANDREW MORSE 2 Jun. 1987 9 p Filed 31 Mar. 1986 Supersedes N86-24700 (24 - 15, p 2417)
(NASA-CASE-ARC-11633-1; US-PATENT-4,669,958;
US-PATENT-APPL-SN-846439; US-PATENT-CLASS-416-114;
US-PATENT-CLASS-416-158) Avail: US Patent and Trademark Office CSCL 01C

A mechanical system to control the position of a rotating swashplate is developed. This system provides independent lateral cyclic, longitudinal cyclic and collective pitch control of a helicopter rotor attached to the swashplate, without use of a mixer box. The system also provide direct, linear readout of cyclic and collective swashplate positions.

Official Gazette of the U.S. Patent and Trademark Office



09

RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

N87-25334* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

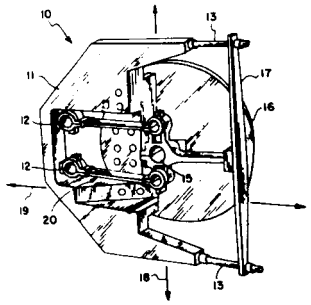
AIRFOIL FLUTTER MODEL SUSPENSION SYSTEM Patent

WILMER H. REED, inventor (to NASA) (DEI-Tech, Inc., Newport News, Va.) 28 Jul. 1987 9 p Filed 30 Jul. 1986 Supersedes N86-31594 (24 - 23, p 3560)
(NASA-CASE-LAR-13522-1-SB; US-PATENT-4,682,494;
US-PATENT-APPL-SN-890575; US-PATENT-CLASS-73-147;
US-PATENT-CLASS-73-856) Avail: US Patent and Trademark Office CSCL 14B

A wind tunnel suspension system for testing flutter models under various loads and at various angles of attack is described. The invention comprises a mounting bracket assembly affixing the suspension system to the wind tunnel, a drag-link assembly and a compound spring arrangement comprises a plunge spring working in opposition to a compressive spring so as to provide a high stiffness to trim out steady state loads and simultaneously a low stiffness to dynamic loads. By this arrangement an airfoil may be

tested for oscillatory response in both plunge and pitch modes while being held under high lifting loads in a wind tunnel.

Official Gazette of the U.S. Patent and Trademark Office



N87-25335*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

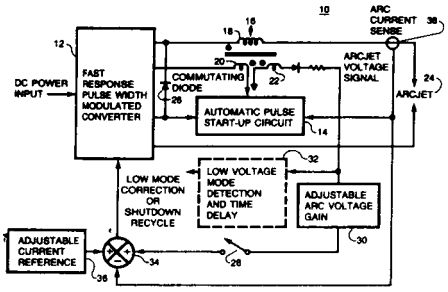
ARCJET POWER SUPPLY AND START CIRCUIT Patent Application

ROBERT P. GRUBER, inventor (to NASA) 10 Jun. 1987 10 p (NASA-CASE-LEW-14374-1; US-PATENT-APPL-SN-060200)

Avail: NTIS HC A02/MF A01 CSCL 14B

A dc power supply for spacecraft arcjet thrusters has an integral automatic starting circuit and an output averaging inductor. The output averaging inductor, in series with the load, provides instantaneous current control, and ignition pulse and an isolated signal proportional to the arc voltage. A pulse width modulated converter, close loop configured, is also incorporated to give fast response output current control.

NASA



14

GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

N87-25344* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

WEIGHTLESSNESS SIMULATION SYSTEM AND PROCESS Patent

HUBERT C. VYKUKAL, inventor (to NASA) 7 Jul. 1987 8 p Filed 29 Oct. 1986 Supersedes N87-15253 (25 - 7, p 873) (NASA-CASE-ARC-11646-1; US-PATENT-4,678,438; US-PATENT-APPL-SN-924398; US-PATENT-CLASS-434-34)

Avail: US Patent and Trademark Office CSCL 14B

A weightlessness simulator has a chamber and a suit in the chamber. O-rings and valves hermetically seal the chamber. A vacuum pump connected to the chamber establishes a pressure in the chamber less than atmospheric pressure. A water supply tank and water supply line supply a body of water to the chamber as a result of partial vacuum created in the chamber. In use, an astronaut enters the pressure suit through a port, which remains open to ambient atmosphere, thus supplying air to the astronaut during use. The pressure less than atmospheric pressure in the chamber is chosen so that the pressure differential from the inside to the outside of the suit corresponds to the pressure differential with the suit in outer space.

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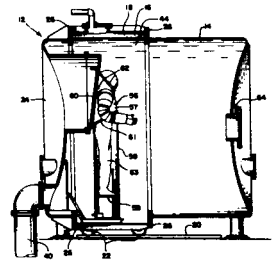


16

SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

N87-29582*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

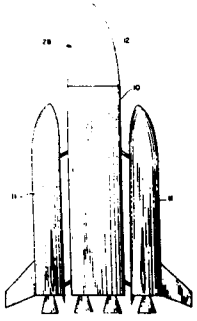
EARTH-TO-ORBIT VEHICLE PROVIDING A REUSABLE ORBITAL STAGE AND METHOD OF UTILIZING SAME Patent Application

JAMES A. MARTIN, inventor (to NASA) 23 Jul. 1987 15 p (NASA-CASE-LAR-13486-1; NAS 1.71:LAR-13486-1; US-PATENT-APPL-SN-076955) Avail: NTIS HC A02/MF A01 CSCL 22B

A reusable Earth-to-orbit vehicle is described with an orbital stage sized to fit into a payload bay equipped, Earth-return-capable space vehicle such as the United States Space Shuttle. The orbital stage is equipped with a reusable rocket engine capable of operation from the Earth's surface to Earth orbit. The orbital stage propels itself into Earth orbit with the help of boosters that separate

and return to Earth before orbit is reached. After delivering its payload, the orbital stage is placed in the Earth-return-capable space vehicle's payload bay and returned to Earth for reuse.

NASA



to cause display of fewer fields. If greater resolution is desired, the control signal is adjusted to increase the sampling ratio.

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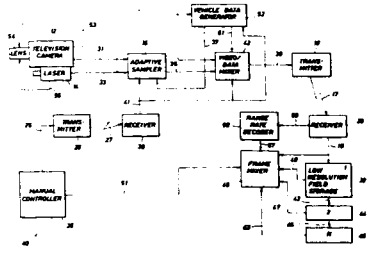


17

SPACECRAFT COMMUNICATION, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

N87-25348* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND APPARATUS FOR TELEMETRY ADAPTIVE BANDWIDTH COMPRESSION Patent

OLIN L. GRAHAM 21 Jul. 1987 11 p Filed 13 Sep. 1985 Supersedes N86-20466 (24 - 11, p 1731)
(NASA-CASE-MSC-20821-1; US-PATENT-4,682,225; US-PATENT-APPL-SN-775990; US-PATENT-CLASS-358-133; US-PATENT-CLASS-358-105; US-PATENT-CLASS-358-138)
Avail: US Patent and Trademark Office CSCL 09F

Methods and apparatus are provided for automatic and/or manual adaptive bandwidth compression of telemetry. An adaptive sampler samples a video signal from a scanning sensor and generates a sequence of sampled fields. Each field and range rate information from the sensor are hence sequentially transmitted to and stored in a multiple and adaptive field storage means. The field storage means then, in response to an automatic or manual control signal, transfers the stored sampled field signals to a video monitor in a form for sequential or simultaneous display of a desired number of stored signal fields. The sampling ratio of the adaptive sample, the relative proportion of available communication bandwidth allocated respectively to transmitted data and video information, and the number of fields simultaneously displayed are manually or automatically selectively adjustable in functional relationship to each other and detected range rate. In one embodiment, when relatively little or no scene motion is detected, the control signal maximizes sampling ratio and causes simultaneous display of all stored fields, thus maximizing resolution and bandwidth available for data transmission. When increased scene motion is detected, the control signal is adjusted accordingly

18

SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

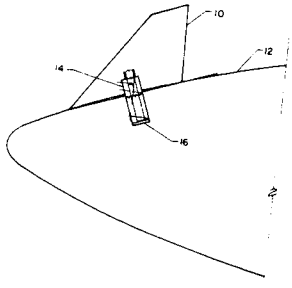
N87-24524*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.

DORSAL FIN FOR EARTH-TO-ORBIT TRANSPORTS Patent Application

IAN O. MACCONOCHIE, inventor (to NASA), HOWARD W. STONE, JR., inventor (to NASA), and RICHARD W. POWELL, inventor (to NASA) 12 Feb. 1987 9 p
(NASA-CASE-LAR-13127-1; NAS 1.71:LAR-13127-1; US-PATENT-APPL-SN-013769) Avail: NTIS HC A02/MF A01 CSCL 22B

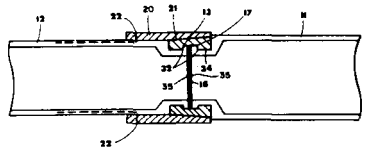
A substantially trapezoidal dorsal fin is mounted on the centerline of the forebody of an aircraft. To obtain the desired dorsal fin, an airfoil with a high thickness-to-chord ratio is cut near the maximum thickness station thereof. The dorsal fin is attached to the aircraft by a device, such as a trunnion, which allows the dorsal fin to pivot about the attachment point. The dorsal fin is actively controlled and, in the deflected states thereof, applies a side force to the forebody of the aircraft, altering the flight direction. The novelty of this invention resides in the forward location of the dorsal fin which provides improved lateral directional control for an aircraft, especially an Earth-to-orbit transport.

NASA



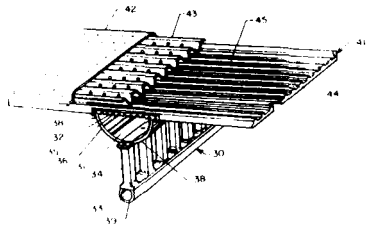
N87-27713* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRELOADED SPACE STRUCTURAL COUPLING JOINTS Patent
MARVIN D. RHODES, inventor (to NASA) 4 Aug. 1987 10 p Filed 30 Jul. 1986 Supersedes N86-21630 (24 - 23, p 3565
(NASA-CASE-LAR-13489-1; US-PATENT-4,684,156;
US-PATENT-APPL-SN-890445; US-PATENT-CLASS-285-27;
US-PATENT-CLASS-285-31; US-PATENT-CLASS-285-86;
US-PATENT-CLASS-285-373; US-PATENT-CLASS-285-421;
US-PATENT-CLASS-403-341) Avail: US Patent and Trademark Office CSCL 22B

A coupling device for tubular members of large truss structures with a locking collar being the only moving part is described. Each tubular member is constructed with an end bell section that has a belled flange with a mating face, and a necked area which is smaller in diameter than the tubular members to be joined. A split ring is affixed to each tubular member and is constructed so that when two tubular members are laterally moved into axial alignment and the collar is rotated over it, the split ring loads the joint with axial forces by pressing the belled flange mating surfaces together, and a preloading force is provided by the collar mating with a taper on the outside of the split rings. All free play is thereby removed by preloaded force. A major object is to provide an ability to remove and replace individual tubular members without disturbing other structural parts of a truss structure. An additional anticipated use of this joint is to couple high pressure fluid lines.
Official Gazette of the U.S. Patent and Trademark Office



N87-29586*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE VEHICLE THERMAL REJECTION SYSTEM Patent Application
HERBERT J. TANZER, inventor (to NASA) (Hughes Aircraft Co., Culver City, Calif.) 15 Jul. 1987 16 p
(NASA-CASE-LAR-13738-1; NAS 1.71:LAR-13738-1;
US-PATENT-APPL-SN-073539) Avail: NTIS HC A02/MF A01 CSCL 22B

A space vehicle thermal heat rejection system utilizes separate optimized heat pipe components for the functions of heat acquisition, heat transport, and heat rejection. A honeycomb panel heat pipe evaporator section performs the function of heat acquisition, and forms a closed thermodynamic system with a dual channel heat pipe transport section, which performs the function of heat transport. A plurality of truss or channel core heat pipe rejection fins form the condensor section, which performs the function of heat rejection. A common wall separates the condensor section from the transport section. Using the above heat pipe components and having efficient interfacing between them results in high performance factors for the overall system. NASA



23

CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N87-23698* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PREPARATION OF B-TRICHLOROBORAZINE Patent
SALVATORE R. RICCITIELLO, MING-TA S. HSU, and TIMOTHY S. CHEN, 03inventors (to NASA) (Chem, H. C. Research and Service Corp., San Jose, Calif) 30 Jun. 1987 6 p Filed 28 Aug. 1986 Supersedes N87-15275 (25 - 7, p 877)
(NASA-CASE-ARC-11643-1-SB; US-PATENT-4,676,962;
US-PATENT-APPL-SN-901496; US-PATENT-CLASS-423-284;
US-PATENT-CLASS-423-276) Avail: US Patent and Trademark Office CSCL 07A

The present invention relates to a method of preparing B-trichloroborazine. Generally, the method includes the combination of gaseous boron trichloride in an anhydrous aprotic organic solvent followed by addition of excess gaseous ammonia at ambient temperature or below. The reaction mixture is heated to about 100 to 140 C followed by cooling, removal of the solid ammonium chloride at ambient temperature, distillation of the solvent under vacuum if necessary at a temperature of up to about 112 C, and recovery of the B-trichloroborazine. Solvents include toluene, benzene, xylene, chlorinated hydrocarbons, chlorinated aromatic compounds, or mixtures thereof. Toluene is a preferred solvent. The process provides a convenient synthesis of a material which often decomposes on standing. B-trichloroborazine is useful in a number of chemical reactions, and particularly in the formation of high temperature inorganic polymers and polymer precursors.
Official Gazette of the U.S. Patent and Trademark Office

N87-28605* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE 1-((DIORGANOOXY PHOSPHONYL) METHYL)-2,4- AND -2,6-DIAMINO BENZENES AND THEIR DERIVATIVES Patent
JOHN A. MIKROYANNIDIS, inventor (to NASA) and DEMETRIUS A. KOURTIDES, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.) 25 Aug. 1987 7 p Filed 16, Aug. 1984 Supersedes N86-20499 (24 - 11, p 1737) Continuation-in-part of US-Appl-SN-522629, filed 12 Aug. 1983, abandoned
(NASA-CASE-ARC-11425-2; US-PATENT-4,689,421;
US-PATENT-APPL-SN-641152; US-PATENT-CLASS-558-145;
US-PATENT-CLASS-558-190; US-PATENT-CLASS-558-193)

Avail: US Patent and Trademark Office CSCL 07C

The 1-((diorganooxy phosphonyl) methyl)-2,4- and -2,6-dinitro- and diamino benzenes are prepared by nitrating an (organo phosphenyl) methyl benzene to produce the dinitro compounds which are then reduced to the diamino compounds. The organo groups (alkyl, haloalkyl, aryl) on the phosphorus may be removed to give the free acids (HO)2P(=0)-. The diamino compounds may be polymerized with dianhydrides or diacyl halides to produce fire and flame resistant polymers which are useful in the manufacture of aircraft structures.

Official Gazette of the U.S. Patent and Trademark Office

24

COMPOSITE MATERIALS

Includes laminates.

N87-27742* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LIGHTWEIGHT PISTON Patent
ALLAN H. TAYLOR, inventor (to NASA) 4 Aug. 1987 8 p Filed 2 May 1985 Supersedes N85-28975 (23 - 18, p 3068)
(NASA-CASE-LAR-13150-1; US-PATENT-4,683,809; US-PATENT-APPL-SN-729767; US-PATENT-CLASS-92-208; US-PATENT-CLASS-29-156.5R) Avail: US Patent and Trademark Office CSCL 11D

A lightweight piston composed of carbon-carbon composites is presented. The use of carbon-carbon composites over conventional materials, such as aluminum, reduces piston weight and improves thermal efficiency of the internal combustion reciprocation engine. Due to the negligible coefficient of thermal expansion and unique strength at elevated temperatures of carbon-carbon, the piston-to-cylinder wall clearance is so small as to eliminate the necessity for piston rings. Use of the carbon-carbon composite has the effect of reducing the weight of other reciprocating engine components allowing the piston to run at higher speeds and improving specific engine performance.

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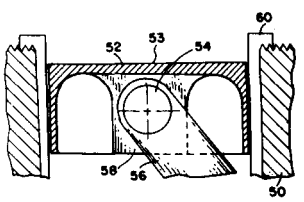


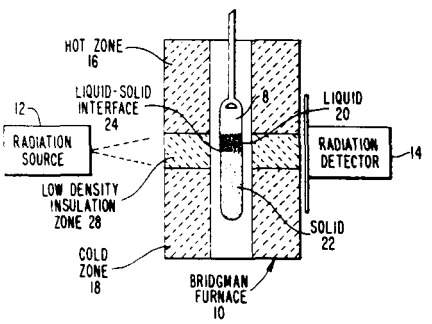
25

INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

N87-23713*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPARATUS AND PROCEDURE TO DETECT A LIQUID-SOLID INTERFACE DURING CRYSTAL GROWTH IN A BRIDGMAN FURNACE Patent Application
PATRICK G. BARBER, inventor (to NASA), ROGER K. CROUCH, inventor (to NASA), ARCHIBALD L. FRIPP, JR., inventor (to NASA), ROBERT F. BERRY, JR., inventor (to NASA), WILLIAM J. DEBNAM, JR., inventor (to NASA), and RICHARD T. SIMCHICK, inventor (to NASA) (PRC Kentron, Inc., Hampton, Va.) 29 Jan. 1987 10 p
(NASA-CASE-LAR-13597-1-CU; US-PATENT-APPL-SN-008199)
Avail: NTIS HC A02/MF A01 CSCL 07D

This invention relates to a method and apparatus for detecting a liquid-solid interface of a substance. In particular, the invention detects the liquid-solid interface of a semiconductor crystal grown in a Bridgman furnace. A substance, such as germanium, in a Bridgman furnace is irradiated by solid-penetrating energy from a radiation source. The solid penetrating energy is detected by a radiation detector. Differences in the intensity of the detected energy indicate the shape of the liquid-solid interface. In the case of germanium, X-rays can be used as the solid penetrating energy, while in the case of a substance such as lead tin telluride, gamma rays are perferable. The invention enables detection of the shape of the liquid-solid interface of a semiconductor substance during growth of a crystal formed from the substance. Variations in several characteristics of semiconductor crystals are believed to be related to the shape of the liquid-solid interface, but previously there was no means to detect the shape of the liquid-solid interface during growth of the crystal. NASA



26

METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-25455* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OXYGEN DIFFUSION BARRIER COATING Patent
JALAIAH UNNAM, inventor (to NASA) (Analytical Services and Materials, Inc., Tabb, Va.) and RONALD K. CLARK, inventor (to NASA) 21 Jul. 1987 8 p Filed 18 Mar. 1986 Supersedes N86-24814 (24 - 15, p 2435)
(NASA-CASE-LAR-13474-1-SB; US-PATENT-4,681-818; US-PATENT-APPL-SN-840900; US-PATENT-CLASS-428-607; US-PATENT-CLASS-428-632; US-PATENT-CLASS-428-651; US-PATENT-CLASS-428-660; US-PATENT-CLASS-148-6.3; US-PATENT-CLASS-204-192.15; US-PATENT-CLASS-204-192.23)
Avail: US Patent and Trademark Office CSCL 11F

A method for coating a titanium panel or foil with aluminum and amorphous silicon to provide an oxygen barrier abrogating oxidation of the substrate metal is developed. The process is

accomplished with known inexpensive procedures common in materials research laboratories, i.e., electron beam deposition and sputtering. The procedures are conductive to treating foil gage titanium and result in submicron layers which virtually add no weight to the titanium. There are no costly heating steps. The coatings blend with the substrate titanium until separate mechanical properties are subsumed by those of the substrate without cracking or spallation. This method appreciably increases the ability of titanium to mechanically perform in high thermal environments such as those witnessed on structures of space vehicles during re-entry

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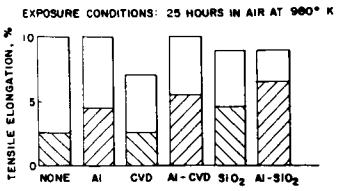
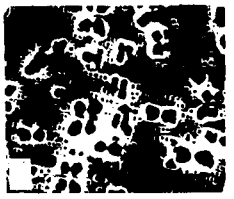


N87-28647* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

HEAT TREATMENT FOR SUPERALLOY Patent

FREDRIC H. HARF, inventor (to NASA) 30 Jun. 1987 6 p Filed 24 Feb. 1986 Supersedes N86-26414 (24 - 12, p 2706) (NASA-CASE-LEW-14262-1; US-PATENT-4,676,846; US-PATENT-APPL-SN-832296; US-PATENT-CLASS-148-162; US-PATENT-CLASS-148-410) Avail: US Patent and Trademark Office CSCL 11F

A cobalt-free nickel-base superalloy composed of in weight % 15 Cr-5 Mo-3.5 Ti-4 Al-0.07 (max) C-remainder Ni is given a modified heat treatment. With this heat treatment the cobalt-free alloy achieves certain of the mechanical properties of the corresponding cobalt-containing nickel-base superalloy at 1200 F (650 C). Thus, strategic cobalt can be replaced by nickel in the alloy. Official Gazette of the U.S. Patent and Trademark Office

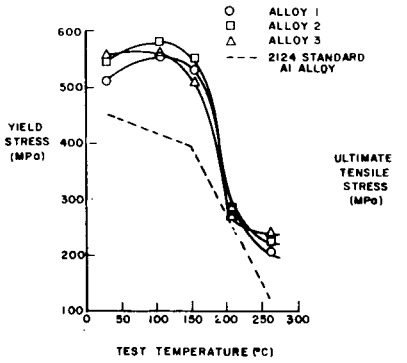


N87-29650*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ELEVATED TEMPERATURE ALUMINUM ALLOYS Patent Application

PETER MESCHTER, inventor (to NASA), RICHARD J. LEDERICH, inventor (to NASA), and JAMES E. ONEAL, inventor (to NASA) (McDonnell-Douglas Corp., St. Louis, Mo.) 30 Jul. 1987 12 p (NASA-CASE-LAR-13632-1; NAS 1.71:LAR-13632-1; US-PATENT-APPL-SN-079316) Avail: NTIS HC A02/MF A01 CSCL 11F

Three aluminum-lithium alloys are provided for high performance aircraft structures and engines. All three alloys contain 3 wt% copper, 2 wt% lithium, 1 wt% magnesium, and 0.2 wt% zirconium. Alloy 1 has no further alloying elements. Alloy 2 has the addition of 1 wt% iron and 1 wt% nickel. Alloy 3 has the addition of 1.6 wt% chromium to the shared alloy composition of the three alloys. The balance of the three alloys, except for incidental impurities, is aluminum. These alloys have low densities and improved strengths at temperatures up to 260 C for long periods of time. NASA



27

NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N87-21111* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

QUASI-CONTAINERLESS GLASS FORMATION METHOD AND APPARATUS Patent

ROBERT J. NAUMANN, inventor (to NASA) and EDWIN C. ETHRIDGE, inventor (to NASA) 31 Mar. 1987 10 p Filed 5 Dec. 1985 Supersedes N86-21684 (24 - 12, p 1926 (NASA-CASE-MFS-28090-1; US-PATENT-4,654,065; US-PATENT-APPL-SN-805012; US-PATENT-CLASS-65-2; US-PATENT-CLASS-65-13; US-PATENT-CLASS-65-134; US-PATENT-CLASS-65-136) Avail: US Patent and Trademark Office CSCL 11B

Glass rods or fibers are prepared from a polycrystalline rod by heating a short section of the rod in a first furnace to form a molten zone of the rod, heating a second short section of the rod in a second furnace to form a second molten zone and gradually moving the furnaces apart from one another to form an elongated molten float zone, which is cooled in its midsection to produce a glass rod between the molten zones. In another embodiment a single moving furnace assembly and a precursor rod with compositional gradient sections, are used, and the moving furnace traverses the rod so that the molten portion is drawn out to a degree whereby a fiber of ultrapure glass is formed.

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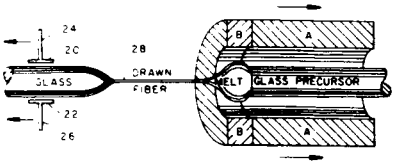

N87-21112* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PROCESS FOR PREPARING PHTHALOCYANINE POLYMER FROM IMIDE CONTAINING BISPHTHALONITRILE Patent

BAPPALIGE N. ACHAR, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.), GEORGE M. FOHLEN, inventor (to NASA), and JOHN A. PARKER, inventor (to NASA) 10 Mar. 1987 9 p Filed 12 Jul. 1985 Supersedes N86-19461 (24 - 10, p 1560)

(NASA-CASE-ARC-11511-2; US-PATENT-4,649,189; US-PATENT-APPL-SN-754362; US-PATENT-CLASS-528-220; US-PATENT-CLASS-528-229; US-PATENT-CLASS-528-322; US-PATENT-CLASS-528-327; US-PATENT-CLASS-528-331; US-PATENT-CLASS-528-362) Avail: US Patent and Trademark Office CSCL 11B

Imide-linked bisphthalonitrile compounds are prepared by combining a dicyano aromatic diamine and an organic dianhydride to produce an amic acid linked bisphthalonitrile compound. The amic acid linked bisphthalonitrile compound is dehydrocyclized to produce the imide-linked bisphthalonitrile compounds. The imide-linked bisphthalonitrile compounds may be polymerized to produce a phythalocyanine polymer by heating the imide-linked bisphthalonitrile compound, either alone or in the presence of a metal powder or a metal salt. These compounds are useful in the coating, laminating and molding arts. The polymers are useful in composite matrix resins where increased fire resistance, toughness and resistance to moisture are required, particularly as secondary structures in aircraft and spacecraft.

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N87-22845* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRUCTURAL PANELS Patent

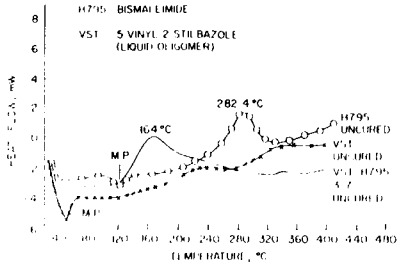
JOHN A. PARKER, inventor (to NASA), ALVIN H. HEIMBUCH, inventor (to NASA), MING-TA S. HSU, inventor (to NASA), and TIMOTHY S. CHEN, inventor (to NASA) (San Jose State Univ., Calif.) 3 Mar. 1987 10 p Filed 22 Apr. 1985 Division of US-Patent-4,526,925, US-Patent-Appl-SN-553339, filed 18 Nov. 1983

(NASA-CASE-ARC-11429-2-CU; US-PATENT-4,647,615; US-PATENT-4,526,925; US-PATENT-APPL-SN-725727; US-PATENT-APPL-SN-553339; US-PATENT-CLASS-524-548; US-PATENT-CLASS-524-404; US-PATENT-CLASS-525-182; US-PATENT-CLASS-526-262) Avail: US Patent and Trademark Office CSCL 11B

Vinyl pyridines including vinyl stilbazole materials and vinyl styrylpyridine oligomer materials are disclosed. These vinylpyridines form copolymers with bismaleimides which copolymers have good fire retardancy and decreased brittleness. The cure temperatures of the copolymers are substantially below the cure temperatures of the bismaleimides alone. Reinforced composites made from the cured copolymers are disclosed as well.

Official Gazette of the U.S. Patent and Trademark Office

DSC OF BISMALEIMIDE AND VST/BISMALEIMIDE COPOLYMERS



N87-22847* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

POLYENAMINES FROM AROMATIC DIACETYLENIC DIKETONES AND DIAMINES Patent

PAUL M. HERGENROTHER, inventor (to NASA), ROBERT G. BASS, inventor (to NASA), MARK S. SINSKY, inventor (to NASA), and JOHN W. CONNELL, inventor (to NASA) (Virginia Commonwealth Univ., Richmond.) 5 May 1987 7 p Filed 15 May 1985 Supersedes N86-19462 (24 - 10, p 1560)

(NASA-CASE-LAR-13444-1-CU; US-PATENT-4,663,483; US-PATENT-APPL-SN-734366; US-PATENT-CLASS-564-396; US-PATENT-CLASS-564-330; US-PATENT-CLASS-564-430; US-PATENT-CLASS-546-262; US-PATENT-CLASS-546-264; US-PATENT-CLASS-528-229) Avail: US Patent and Trademark Office CSCL 11B

The synthesis and characterization of several polyenamine ketones are discussed wherein conjugated diacetylenic diketones and aromatic diamines are used as a route to the formation of high molecular weight polyenamine ketones which exhibit good mechanical properties and can be cast into creasible films. Typical polymerization conditions involved the reaction of stoichiometric amounts of 1,4- or 1,3-PPPO and a diamine at 60 to 130 C in m-cresol at (w/w) solids content of 8 to 26% for a specified period of time under a nitrogen atmosphere. Novel polyenamine ketones were prepared with inherent viscosities as high as 1.99 dl/g and tough, clear amber films with tensile strengths of 12,400 psi and tensile moduli of 397,000 psi were cast from solutions of the polymers in chloroform. In most cases, the elemental analyses for the polyenamine ketones agree within + or - 0.3% of the theoretical values.

Official Gazette of the U.S. Patent and Trademark Office

N87-22848* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PROCESS FOR CROSSLINKING AND EXTENDING CONJUGATED DIENE-CONTAINING POLYMERS Patent

VERNON L. BELL, inventor (to NASA) and STEPHEN J. HAVENS, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) 28 Apr. 1977 8 p Filed 11 May 1986 Supersedes N86-25477 (24 - 16, p 2544)

(NASA-CASE-LAR-13452-1; US-PATENT-4,661,558; US-PATENT-APPL-SN-838655; US-PATENT-CLASS-525-36; US-PATENT-CLASS-528-176; US-PATENT-CLASS-528-184; US-PATENT-CLASS-528-192; US-PATENT-CLASS-528-193) Avail: US Patent and Trademark Office CSCL 11B

A process using a Diels-Alder reaction which increases the molecular weight and/or crosslinks polymers by reacting the polymers with bisunsaturated dienophiles is developed. The polymer comprises at least 75% by weight based on the reaction product, has a molecular weight of at least 5000 and a plurality of conjugated 1,3-diene systems incorporated into the molecular structure. A dienophile reaction with the conjugated 1,3-diene of the polymer is at least 1% by weight based on the reaction product. Examples of the polymer include polyesters, polyamides, polyethers, polysulfones and copolymers. The bisunsaturated dienophiles may include bis-maleimides, bis maleic and bis fumaric esters and amides. This method for expanding the molecular weight chains of the polymers, preferable thermoplastics, is advantageous for processing or fabricating thermoplastics. A low molecular weight thermoplastic is converted to a high molecular weight plastic having improved strength and toughness for use in the completed end use article.

Official Gazette of the U.S. Patent and Trademark Office

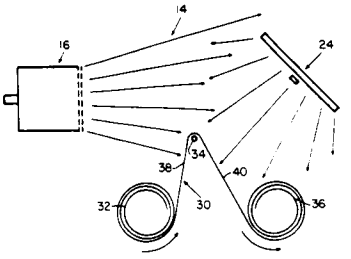
N87-23736* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

OXIDATION PROTECTION COATINGS FOR POLYMERS Patent

JAMES S. SOVEY, inventor (to NASA), BRUCE A. BANKS, inventor (to NASA), and MICHAEL J. MIRTICH, inventor (to NASA) 12 May 1987 7 p Filed 27 Feb. 1986 Supersedes N86-26434 (24

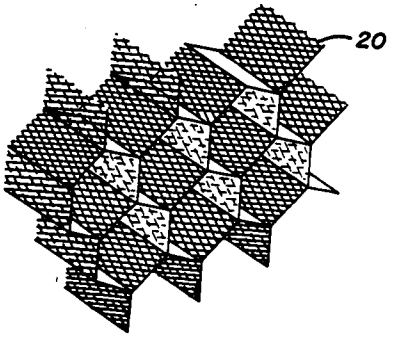
-17, p 2709) Division of US-Patent-4,604,181, Patent-Appl-SN-761235, which is a division of US-Patent-4,560,577, US-Patent-Appl-SN-649330
(NASA-CASE-LEW-14072-3; US-PATENT-4,664,980;
US-PATENT-APPL-SN-834977; US-PATENT-CLASS-428-421;
US-PATENT-CLASS-428-422; US-PATENT-CLASS-428-447;
US-PATENT-CLASS-428-473.5; US-PATENT-CLASS-428-702)
Avail: US Patent and Trademark Office CSCL 11B

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about four volume percent polymer to provide flexibility. NASA



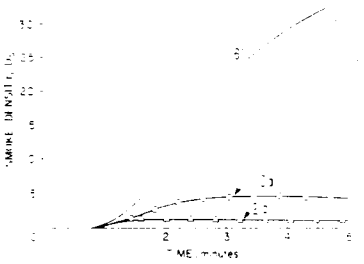
N87-23737*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CERAMIC HONEYCOMB STRUCTURES AND THE METHOD THEREOF Patent Application
SALVATORE R. RICCITIELLO, inventor (to NASA) and DOMENICK E. CAGLIOSTRO, inventor (to NASA) 29 Jan. 1987 17 p
(NASA-CASE-ARC-11652-1; NAS 1.71:ARC-11652-1;
US-PATENT-APPL-SN-008242) Avail: NTIS HC A02/MF A01
CSCL 11B

The subject invention pertains to a method of producing an improved composite-composite honeycomb structure for aircraft or aerospace use. Specifically, the subject invention relates to a method for the production of a lightweight ceramic-ceramic composite honeycomb structure, which method comprises: (1) pyrolyzing a loosely woven fabric/binder having a honeycomb shape and having a high char yield and geometric integrity after pyrolysis at between about 700 and 1,100 C; (2) substantially evenly depositing at least one layer of ceramic material on the pyrolyzed fabric/binder of step (1); (3) recovering the coated ceramic honeycomb structure; (4) removing the pyrolyzed fabric/binder of the structure of step (3) by slow pyrolysis at between 700 and 1000 C in between about a 2 to 5% by volume oxygen atmosphere for between about 0.5 and 5 hr.; and (5) substantially evenly depositing on and within the rigid hollow honeycomb structure at least one additional layer of the same or a different ceramic material by chemical vapor deposition and chemical vapor infiltration. The honeycomb shaped ceramic articles have enhanced physical properties and are useful in aircraft and aerospace uses. NASA



N87-23751* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE AND HEAT RESISTANT LAMINATING RESINS BASED ON MALEMEIDO AND CITRACONIMIDO SUBSTITUTED 1 -2,4- AND -2,6- DIAMINOBENZENES Patent
JOHN A. MIKROYANNIDIS (National Academy of Sciences - National Research Council, Washington, D. C.) and DEMETRIUS A. KOURTIDES, 02inventors (to NASA) 2 Jun. 1987 11 p Filed 16 Aug. 1984 Supersedes N85-21364 (23 - 12, p 1812) Continuation-in-part of US-Patent-Appl-SN-522629, filed 12 Aug. 1983, abandoned
(NASA-CASE-ARC-11533-1; US-PATENT-4,670,565;
US-PATENT-APPL-SN-641147; US-PATENT-CLASS-548-413)
Avail: US Patent and Trademark Office CSCL 11B

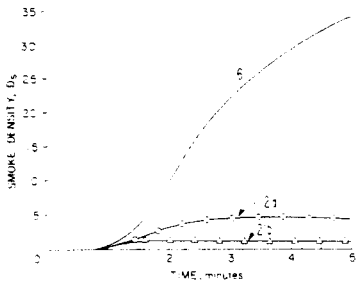
A novel class of fire and heat resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-(dialkox phosphonyl) methyl-2-4 and -2,6-diamino benzenes was presented. The polymer precursors are prepared by reacting 1-(diorgano oxyphosphonyl) methyl-2-4- and -2,6-diamino benzenes with maliec anhydride or citraconic anhydride in a mole ratio 1:2. Chain extension of the monomers is achieved by reacting the mono-N-maleimido derivaties of 1 oxyphosphonyl) methyl• -2,4- and -2,6-diamino benzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylene bis(4-phenyl isocyanate), in a mole ratio 2:1. The polymerization of the monomers is studied by diferential scanning calorimetry and the thermal stability of the polymers is ascertained by thermogravimetric analysis.
Official Gazette of the U.S. Patent and Trademark Office



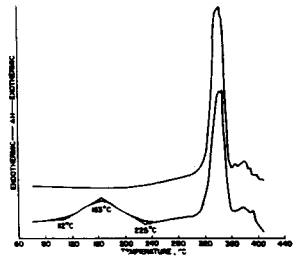
N87-24564* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE AND HEAT RESISTANT LAMINATING RESINS BASED ON MALEIMIDO AND CITRACONIMIDO SUBSTITUTED 1-(DIORGANO OXYPHOSPHONYL) METHYL -2,4- AND -2,6-DIAMINOBENZENES Patent
JOHN A. MIKROYANNIDIS, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.) and DEMETRIUS A. KOURTIDES, inventor (to NASA) 23 Jun. 1987 11 p Filed 10 Apr. 1986 Division of US-Patent-Appl-SN-641147, filed 16 Aug. 1984, which is a continuation-in-part of US-Patent-Appl-SN-522629, filed 12 Aug. 1983, abandoned
(NASA-CASE-ARC-11533-3; US-PATENT-4,675,379;
US-PATENT-APPL-SN-852467; US-PATENT-CLASS-528-413)
Avail: US Patent and Trademark Office CSCL 11B

A class of fire and heat resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-((dialkoxyphosphonyl) methyl)-2-4 and -2,6-diaminobenzenes are described. The polymer precursors are prepared by reacting 1-((diorganooxyphosphonyl) methyl)-2-4 and -2,6-diaminobenzenes with maleic anhydride or citraconic anhydride in a mole ratio 1:2. Chain extension of the monomers is achieved by reacting the mono-N-maleimido derivatives of 1-((diorganooxyphosphonyl) methyl)-2,4 and -2,6-diaminobenzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarbocylic dianhydride,

or aryl diisocyanates, such as methylenebis (4-phenylisocyanate), in a mole ratio 2:1. The polymerization of the monomers is studied by differential scanning calorimetry (DSC) and the thermal stability of the polymers is ascertained by thermogravimetric analysis (TGA). Official Gazette of the U.S. Patent and Trademark Office



hr and post cured at between about 215 and 235 C for between O.1 and 2 hr. These resins are useful for making fire resistant elevated temperature stable composites, laminates, molded parts, and adhesives and structures, usually for aircraft secondary structures and for spacecraft construction.
Official Gazette of the U.S. Patent and Trademark Office



N87-24575*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYIMIDES CONTAINING CARBONYL AND ETHER CONNECTING GROUPS Patent Application
PAUL M. HERGENROTHER, inventor (to NASA) and STEPHEN J. HAVENS, inventor (to NASA) (PRC Kentron, Inc., Hampton, Va.) 5 Feb. 1987 18 p
(NASA-CASE-LAR-13633-1; NAS 1.71:LAR-13633-1; US-PATENT-APPL-SN-011693) Avail: NTIS HC A02/MF A01 CSCL 11B

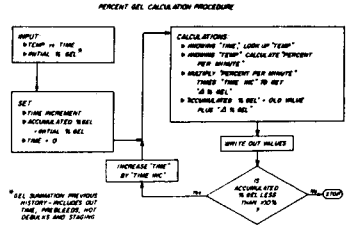
New polyimides have been prepared from the reaction of aromatic dianhydrides with novel aromatic diamines containing carbonyl and ether connecting groups between the aromatic rings. Several of these polyimides were shown to be semi-crystalline polyimides as evidenced by wide angle x-ray diffraction and differential scanning calorimetry. Most of the semi-crystalline polyimides form tough solvent resistant films with high tensile properties. One of these materials exhibits very high fracture toughness and can be thermally processed. NASA

N87-25469* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AMINOPHENOXYCYCLOTRIPHOSPHAZENE CURED EPOXY RESINS AND THE COMPOSITES, LAMINATES, ADHESIVES AND STRUCTURES THEREOF Patent
DEVENDRA KUMAR, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.), GEORGE M. FOHLEN, inventor (to NASA), and JOHN A. PARKER, inventor (to NASA) 26 May 1977 10 p Filed 21 Nov. 1985 Supersedes N85-21686 (24 - 12, p 1927)
(NASA-CASE-ARC-11548-1; US-PATENT-4,668,589; US-PATENT-APPL-SN-806572; US-PATENT-CLASS-428-417; US-PATENT-CLASS-428-413; US-PATENT-CLASS-528-108; US-PATENT-CLASS-528-168) Avail: US Patent and Trademark Office CSCL 11B

Aminophenoxy cyclotriphosphazenes such as hexakis (4-aminophenoxy) cyclotriphosphazene and tris (4-aminophenoxy)-tris phenoxy cyclotriphosphazene are used as curing agents for epoxy resins . These 1,2-epoxy resins are selected from di- or polyepoxide containing organic moieties of the formula (CH2-CHO-CH2) m-W-R-W- (CH2CH-CH2O)m where R is diphenyl dimethylmethane, diphenylmethane; W is a nitrogen or oxygen atom; and m is 1 when W is oxygen and 2 when W is nitrogen. The resins are cured thermally in stages at between about 110 to 135 C for between about 1 and 10 min, then at between about 175 to 185 C for between 0.5 to 10

N87-25473*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD OF CONTROLLING A RESIN CURING PROCESS Patent Application
CHARLES NEAL WEBSTER, inventor (to NASA) and ROBERT O. SCOTT, inventor (to NASA) (LTV Aerospace Corp., Dallas, Tex.) 30 Apr. 1987 21 p
(NASA-CASE-MSC-21169-1; US-PATENT-APPL-SN-044183)
Avail: NTIS HC A02/MF A01 CSCL 11B

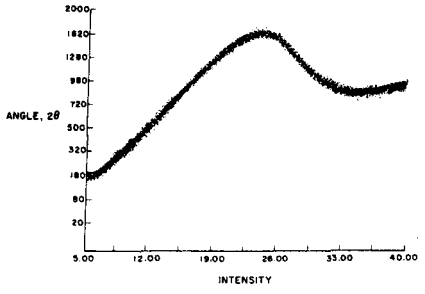
The invention relates to an analytical technique for controlling the curing process of fiber-reinforced composite materials that are formed using thermosetting resins. The technique is the percent gel method and involves development of a time-to-gel equation as a function of temperature. From this equation a rate-of-gel equation is then determined, and a percent gel is calculated which is the product of rate-of-gel times time. Percent gel accounting is used to control the proper pressure application point in an autoclave cure process to achieve desired properties in a production composite part. NASA



N87-25474*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR DEVELOPING CRYSTALLINITY IN LINEAR AROMATIC POLYIMIDES Patent Application
TERRY L. STCLAIR, inventor (to NASA) 7 Apr. 1987 29 p
(NASA-CASE-LAR-13732-1; US-PATENT-APPL-SN-035430)
Avail: NTIS HC A03/MF A01 CSCL 11B

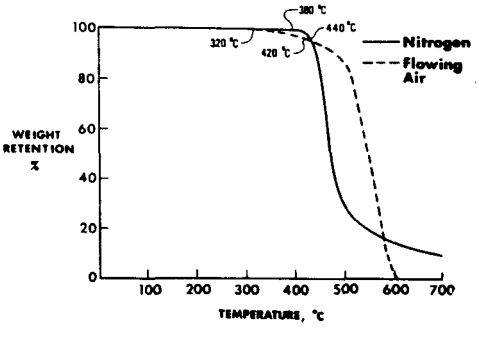
The process of the present invention includes first treating a polyamide-acid (such as LARC-TPI polyamide-acid) in an amide-containing solvent (such as N-methylpyrrolidone) with an aprotic organic base (such as triethylamine), followed by

dehydrating with an organic dehydrating agent (such as acetic anhydride). NASA



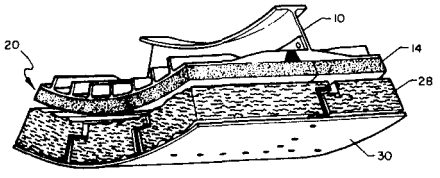
N87-25475*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYPHENYLQUINOXALINES CONTAINING ALKYLENEDIOXY GROUPS Patent Applications
PAUL M. HERGENROTHER, inventors (to NASA) and STEPHEN J. HAVENS, inventors (to NASA) 23 Mar. 1987 17 p
(NASA-CASE-LAR-13601-1-CU; US-PATENT-APPL-SN-028831)
Avail: NTIS HC A02/MF A01 CSCL 11B

Polyphenylquinoxalines were prepared from the reaction of bis(alpha-diketones) with aromatic bis(ortho-diamines). These polyphenylquinoxalines have lower glass transistion temperatures and melt viscosities and consequently better processability than known polyphenylquinoxalines. The properties of these polyphenylquinoxalines (tensile strength, modulus, elongation, adhesive strength, fracture energy, and solvent resistance) are comparable with the properties of known polyphenylquinoxalines. NASA



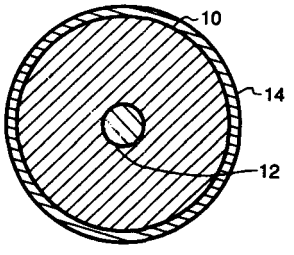
N87-25478*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CRYOGENIC INSULATION SYSTEM Patent Application
RANDALL C. DAVIS, inventor (to NASA), ALLAN H. TAYLOR, inventor (to NASA), L. ROBERT JACKSON, inventor (to NASA), and PATRICK S. MCAULIFFEE, inventor (to NASA) (Lockheed-California Co., Burbank.) 10 Jun. 1987 11 p
(NASA-CASE-LAR-13506-1; US-PATENT-APPL-SN-061182)
Avail: NTIS HC A02/MF A01 CSCL 11C

This invention relates to reusable, low density high temperature cryogenic foam insulation systems and the process for their manufactire. A pacing technology for liquid hydrogen fueled, high speed aircraft is the development of a fully-reusable, flight-weight cryogenic insulation system for propellant tank structures. In the invention cryogenic foam insulation is adhesively bonded to the outer wall of the fuel tank structure. The cryogenic insulation consists of square sheets fabricated from an array of abutting square blocks. Each block consists of a sheet of glass cloth adhesively bonded between two layers of polymethacrylimide foam. Each block is wrapped in a vapor impermeable membrane, such as Kapton(R) aluminum-Kapton(R), to provide a vapor barrier. Very beneficial results can be obtained by employing the present invention in conjunction with fibrous insulation and an outer aeroshell, a hot fuselage structure with an internal thermal protection system. NASA



N87-27810*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FIBER REINFORCED CERAMIC MATERIAL Patent Application
15 Apr. 1987 14 p
(NASA-CASE-LEW-14392-2; NAS 1.71:LEW-14392-2; US-PATENT-APPL-SN-038560) Avail: NTIS HC A02/MF A01 CSCL 11B

A strong and tough SiC/RBSN composite material comprises silicon fibers and a reaction bonded silicon nitride (RBSN) matrix. This composite material may be used at elevated temperatures up to at least 1400 C. NASA



N87-28656* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD OF PREPARING FIBER REINFORCED CERAMIC MATERIAL Patent
RAMAKRISHNA T. BHATT, inventor (to NASA) 25 Aug. 1987 8 p Filed 16 Jul. 1986 Supersedes N87-14517 (25 - 6, p 753)
(NASA-CASE-LEW-14392-1; US-PATENT-4,689,188; US-PATENT-APPL-SN-886149; US-PATENT-CLASS-264-60; US-PATENT-CLASS-264-63; US-PATENT-CLASS-264-332; US-PATENT-CLASS-428-367) Avail: US Patent and Trademark Office CSCL 11B

Alternate layers of mats of specially coated SiC fibers and silicon monotapes are hot pressed in two stages to form a fiber

reinforced ceramic material. In the first stage a die is heated to about 600 C in a vacuum furnace and maintained at this temperature for about one-half hour to remove fugitive binder. In the second stage the die temperature is raised to about 1000 C and the layers are pressed at between 35 and 138 MPa. The resulting preform is placed in a reactor tube where a nitriding gas is flowed past the preform at 1100 to 1400 C to nitride the same.

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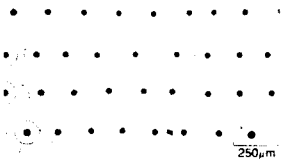


N87-28657* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SEMI-2-INTERPENETRATING NETWORKS OF HIGH TEMPERATURE SYSTEMS Patent

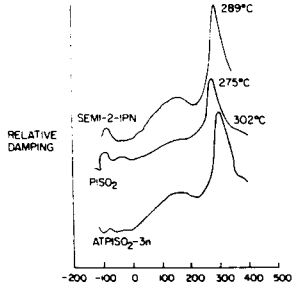
ANNMARIE O. EGLI, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) and TERRY L. STCLAIR, inventor (to NASA) 22 Sep. 1987 8 p Filed 18 Mar. 1986 Supersedes N86-25478 (24 - 16, p 2545)

(NASA-CASE-LAR-13450-1; US-PATENT-4,695,610; US-PATENT-APPL-SN-840816; US-PATENT-CLASS-525-426; US-PATENT-CLASS-525-432; US-PATENT-CLASS-525-436; US-PATENT-CLASS-525-903; US-PATENT-CLASS-428-290)

Avail: US Patent and Trademark Office CSCL 11B

A semi-2-interpenetrating network of improved qualities which is prepared by combining a linear polymer and a cross-linkable oligomer having identical repeating units is developed. Polymers have been combined in the past into interpenetrating networks in order to gain useful properties from the combination of materials. However, previous semi-interpenetrating networks have only been formed using polymers having different repeating units. This method provides a semi-2-interpenetrating network of improved strength, adhesion, and processability.

Official Gazette of the U.S. Patent and Trademark Office



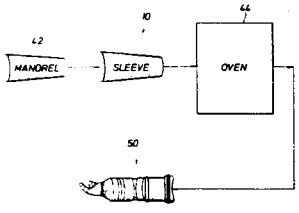
N87-29672*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

TAPERED, TUBULAR POLYESTER FABRIC Patent Application

DONAT J. E. LAPOINTE, inventor (to NASA), LAWRENCE T. WRIGHT, inventor (to NASA), and LAURENCE J. VINCENT, inventor (to NASA) (Albany International Corp., Dedham, Mass.) 30 Jul. 1987 12 p

(NASA-CASE-MSC-21082-1; NAS 1.71:MSC-21082-1; US-PATENT-APPL-SN-079320) Avail: NTIS HC A02/MF A01 CSCL 11E

A tapered tubular polyester sleeve is described to serve as the flexible foundation for a spacesuit limb covering. The tube has a large end and a small end with a length to be determined. The ratio of taper is also determined by scale factors. All the warp yarns extend to the large end. A requisite number of warp yarns extend the full length of the sleeve. Other warp yarns extend from the large end but are terminated along the length of the sleeve. It is then woven with a filling yarn which extends in a full circle along the full length of the sleeve to thereby define the tapered sleeve. The sleeve after fabrication is then placed on a mandrel, heated in an oven, and then attached to the arm or other limb of the spacesuit. NASA



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MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

N87-25489*# National Aeronautics and Space Administration. Pasadena Office, Calif.

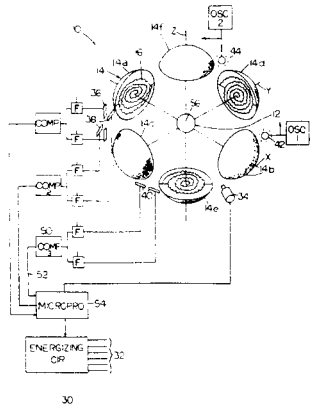
SAMPLE LEVITATION AND MELT IN MICROGRAVITY Patent Application

PHILIP I. MOYNIHAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 30 Apr. 1987 16 p (Contract NAS7-918)

(NASA-CASE-NPO-17022-1-CU; US-PATENT-APPL-SN-066450) Avail: NTIS HC A02/MF A01 CSCL 07D

A system is described for maintaining a sample material in a molten state and away from the walls of a container in a microgravity environment, as in a space vehicle. A plurality of sources of electromagnetic radiation, such as of an infrared wavelength, are spaced about the object, with the total net electromagnetic radiation applied to the object being sufficient to maintain it in a molten state, and with the vector sum of the applied radiation being in a direction to maintain the sample close to a predetermined location away from the walls of a container surrounding the sample. For a processing system in a space vehicle

that orbits the Earth, the net radiation vector is opposite the velocity of the orbiting vehicle. NASA



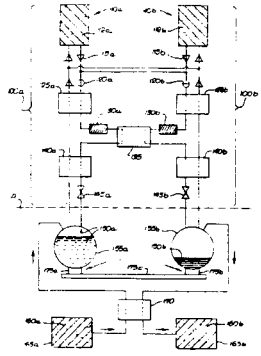
31

ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

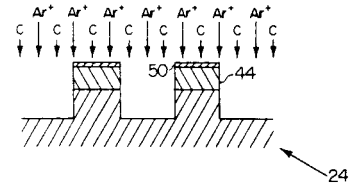
N87-21159* National Aeronautics and Space Administration. Pasadena Office, Calif.
TEN DEGREE KELVIN HYDRIDE REFRIGERATOR Patent
JACK A. JONES, inventor (to NASA) 10 Feb. 1987 6 p Filed 14 Feb. 1985 Supersedes N85-29084 (23 - 18, p 3085)
(NASA-CASE-NPO-16393-1-CU; US-PATENT-4,641,499; US-PATENT-APPL-SN-701486; US-PATENT-CLASS-62-48; US-PATENT-CLASS-62-384; US-PATENT-CLASS-62-514-R)
Avail: US Patent and Trademark Office CSCL 13B

A compact hydride absorption refrigeration system with few moving parts for 10 Kelvin operation is disclosed and comprises liquid hydrogen producing means in combination with means for solidifying and subliming the liquid hydrogen produced. The liquid hydrogen is sublimed at about 10 Kelvin. By using a symmetrical all hydrogen redundant loop system, a 10 Kelvin refrigeration system can be operated for many years with only a fraction of the power required for prior art systems.
Official Gazette of the U.S. Patent and Trademark Office



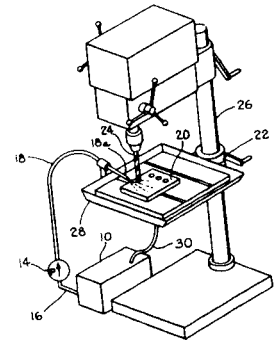
N87-21160* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION BEAM SPUTTER ETCHING Patent
BRUCE A. BANKS and SHARON K. RUTLEDGE 4 Nov. 1986 10 p Filed 13 Sep. 1985 Supersedes N86-20587 (24 - 11, p 1752)
(NASA-CASE-LEW-13899-1; US-PATENT-4,620,898; US-PATENT-APPL-SN-775968; US-PATENT-CLASS-156-643; US-PATENT-CLASS-156-646; US-PATENT-CLASS-156-659.1; US-PATENT-CLASS-156-661.1; US-PATENT-CLASS-156-904; US-PATENT-CLASS-156-345; US-PATENT-CLASS-204-298)
Avail: US Patent and Trademark Office CSCL 13H

An ion beam etching process which forms extremely high aspect ratio surface microstructures using thin sputter masks is utilized in the fabrication of integrated circuits. A carbon rich sputter mask together with unmasked portions of a substrate is bombarded with inert gas ions while simultaneous carbon deposition occurs. The arrival of the carbon deposit is adjusted to enable the sputter mask to have a near zero or even slightly positive increase in thickness with time while the unmasked portions have a high net sputter etch rate.
Official Gazette of the U.S. Patent and Trademark Office



N87-25491* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD FOR MACHINING HOLES IN COMPOSITE MATERIALS Patent
JULIA G. DANIELS, inventor (to NASA), FRANK E. LEDBETTER, III, inventor (to NASA), JOHNNY M. CLEMONS, inventor (to NASA), BENJAMIN G. PENN, inventor (to NASA), and WILLIAM T. WHITE, inventor (to NASA) 21 Jul. 1987 5 p Filed 3 Dec. 1985 Supersedes N86-23750 (24 - 14, p 2263)
(NASA-CASE-MFS-28044-1; US-PATENT-4,680,897; US-PATENT-APPL-SN-804039; US-PATENT-CLASS-51-281-R; US-PATENT-CLASS-408-1-R) Avail: US Patent and Trademark Office CSCL 13H

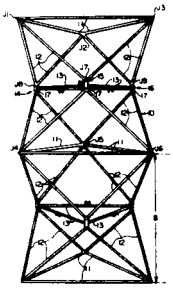
A method for boring well defined holes in a composite material such as graphite/epoxy is discussed. A slurry of silicon carbide powder and water is projected onto a work area of the composite material in which a hole is to be bored with a conventional drill bit. The silicon carbide powder and water slurry allow the drill bit, while experiencing only normal wear, to bore smooth, cylindrical holes in the composite material.
Official Gazette of the U.S. Patent and Trademark Office



N87-25492* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEPLOYABLE GEODESIC TRUSS STRUCTURE Patent
MARTIN M. MIKULAS, JR., inventor (to NASA), MARVIN D. RHODES, inventor (to NASA), and J. WAYNE SIMONTON, inventor (to NASA) 7 Jul. 1987 9 p Filed 20 Feb. 1986 Supersedes N86-24867 (24 - 15, p 2443)
(NASA-CASE-LAR-13113-1; US-PATENT-4,677,803; US-PATENT-APPL-SN-831371; US-PATENT-CLASS-52-646; US-PATENT-CLASS-52-108; US-PATENT-CLASS-52-632; US-PATENT-CLASS-182-152) Avail: US Patent and Trademark Office CSCL 13I

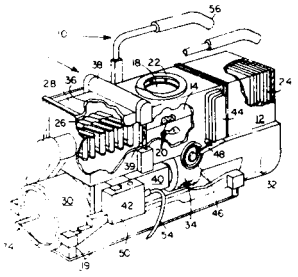
A deployable geodesic truss structure which can be deployed from a stowed state to an erected state is described. The truss structure includes a series of bays, each bay having sets of battens connected by longitudinal cross members which give the bay its axial and torsional stiffness. The cross members are hinged at their mid point by a joint so that the cross members are foldable for deployment or collapsing. The bays are deployed and stabilized by actuator means connected between the mid point joints of the cross members. Hinged longerons may be provided to also connect the sets of battens and to collapse for stowing with the rest of the truss structure.

Official Gazette of the U.S. Patent and Trademark Office



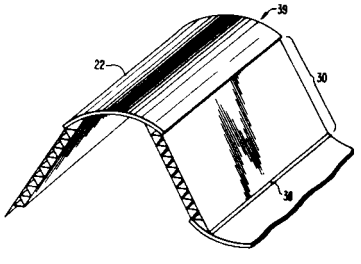
N87-25495*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
IMPROVED METHOD AND APPARATUS FOR WASTE COLLECTION AND STORAGE Patent Application
W. E. THORNTON, inventor (to NASA) and HENRY WHITMORE, inventor (to NASA) 7 Apr. 1987 33 p
(NASA-CASE-MSC-21025-1; US-PATENT-APPL-SN-035401)
Avail: NTIS HC A03/MF A01 CSCL 13B

A method and apparatus for the collection of fecal matter are designed to operate efficiently in a zero gravity environment. The system comprises a waste collection area within a body having a seat opening. Low pressure within the waste collection area directs fecal matter away from the user's buttocks and prevents the escape of undesirable gases. The user actuates a piston covered with an absorbent pad that sweeps through the waste collection area to collect fecal matter, scrub the waste collection area, press the matter against an end of the waste collection area and retracts, leaving the used pad. Multiple pads are provided on the piston to accommodate multiple uses of the system. Also a valve allows air to be drawn through the body, which valve will not be plugged with fecal matter. A sheet feeder feeds fresh sheets of absorbent pad to a face of the piston with each actuation. NASA



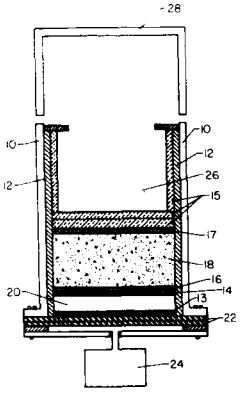
N87-25496*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRUSS-CORE CORRUGATION FOR COMPRESSION LOADS Patent Application
RANDALL C. DAVIS, inventor (to NASA) and L. ROBERT JACKSON, inventor (to NASA) 5 Mar. 1987 15 p
(NASA-CASE-LAR-13438-1; NAS 1.71:LAR-13438-1; US-PATENT-APPL-SN-022298) Avail: NTIS HC A02/MF A01 CSCL 13M

A corrugated panel structure for supporting compressive loads is described which includes curved cap strips separated by truss-core web segments. The truss-core web segments are formed from first and second flat panels with a corrugated filler therebetween. The corrugated filler extends in the direction of the compressive load. As a result, all components of the panel structure have a compressive load carrying capability resulting in a high strength-to-weight ratio when the compressive load is limiting. Application to rocket and aircraft structures is suggested. NASA



N87-29712*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE RIG FOR REPETITIVE CASTING Patent Application
PETER VASQUEZ, inventor (to NASA), WILLIAM R. HUTTO, inventor (to NASA), and ALBERT R. PHILIPS, inventor (to NASA) 30 Jun. 1987 7 p
(NASA-CASE-LAR-13485-1; NAS 1.71:LAR-13485-1; US-PATENT-APPL-SN-067846) Avail: NTIS HC A02/MF A01 CSCL 13H

The invention relates to a pressure rig for repetitive casting of metals. The pressure rig performs like a piston for feeding molten metal into a mold. Pressure is applied to an expandable rubber diaphragm which expands like a balloon to force the metal into the mold. A ceramic cavity which molds molten metal is lined with blanket-type insulating material, necessitating only a relining for subsequent use and eliminating the lengthy cavity preparation inherent in previous rigs. In addition, the expandable rubber diaphragm is protected by the insulating material thereby decreasing its vulnerability to heat damage. As a result of the improved design the life expectancy of the pressure rig contemplated by the present invention is more than doubled. Moreover, the improved heat protection has allowed the casting of brass and other alloys with higher melting temperatures than possible in conventional pressure rigs. NASA



32

COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

N87-21206* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEASUREMENT APPARATUS AND PROCEDURE FOR THE DETERMINATION OF SURFACE EMISSIVITIES Patent
HANS-JUERGEN C. BLUME, inventor (to NASA) 24 Feb. 1987 18 p Filed 3 Dec. 1985 Supersedes N86-24880 (24 - 15, p 2445)
(NASA-CASE-LAR-13455-1; US-PATENT-4,645,358; US-PATENT-APPL-SN-804040; US-PATENT-CLASS-374-9; US-PATENT-CLASS-250-341; US-PATENT-CLASS-374-122)
Avail: US Patent and Trademark Office CSCL 20N

A method and apparatus for independently determining the electromagnetic surface emissivity of a material is developed. This is particularly useful in the design of large deployable space antennas employing mesh membrane surfaces. The system is a closed one with respect to unwanted or uncorrelated radiation outside the system. The present embodiment comprises a radiometer connected to a horn antenna, a test section sealed to the horn antenna and a cryogenically cooled matched load (cryoload) exposed to the interior of the system. The material is enclosed in a convection test chamber within a test section, heated within a test chamber and allowed to radiate within the system such that a component of the radiation energy of the material is measured by the radiometer in terms of brightness temperature. The matched load serves as the stabilizing source of uncorrelated radiation within the system by radiating at a constant cryogenic temperature. The actual physical temperature of the material is also measured during the heating process. Brightness temperature over divided by physical temperature for the same time period is the emissivity of the material according to a derivation of the Raleigh-Jeans approximation for an ideal system free from all uncorrelated radiation.

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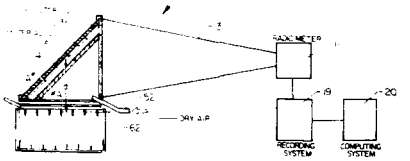

N87-21207* National Aeronautics and Space Administration. Pasadena Office, Calif.
SYNCHRONIZATION TRACKING IN PULSE POSITION MODULATION RECEIVER Patent
VICTOR A. VILNROTTER, 01inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) 3 Mar. 1987 8 p Filed 7 Aug. 1984 Supersedes N84-32620 (22 - 22, p 3572)
(NASA-CASE-NPO-16256-1; US-PATENT-4,648,133; US-PATENT-APPL-SN-638586; US-PATENT-CLASS-455-608; US-PATENT-CLASS-329-107; US-PATENT-CLASS-375-23; US-PATENT-CLASS-375-110; US-PATENT-CLASS-375-120)
Avail: US Patent and Trademark Office CSCL 17B

A clock pulse generator for decoding pulse position modulation in an optical communication receiver is synchronized by a delay tracking loop which multiplies impulses of a data pulse by the square wave clock pulses from the generator to produce positive impulses when the clock pulse is of one level, and negative impulses when the clock pulse is of another level. A delay tracking loop integrates the impulses and produces an error signal that adjusts the delay so the clock pulses will be synchronized with data pulses. A dead-time tau sub d is provided between data pulses of an interval tau sub p in the data pulse period tau. When synchronized, the average number of positive impulses integrated will equal the average number of negative impulses over the continuous stream of data pulses.

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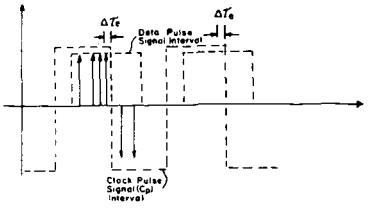
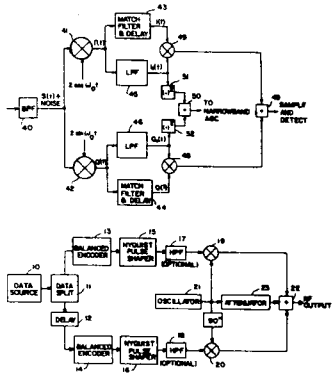


N87-25511* National Aeronautics and Space Administration. Pasadena Office, Calif.
ANTIMULTIPATH COMMUNICATION BY INJECTING TONE INTO NULL IN SIGNAL SPECTRUM Patent
FARAMAZ DAVARIAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Jun. 1987 11 p Filed 2 May 1985 Supersedes N85-29121 (23 - 18, p 3089)
(NASA-CASE-NPO-16414-1-CU; US-PATENT-4,675,880; US-PATENT-APPL-SN-729719; US-PATENT-CLASS-375-39; US-PATENT-CLASS-375-54; US-PATENT-CLASS-375-101; US-PATENT-CLASS-375-102; US-PATENT-CLASS-455-65; US-PATENT-CLASS-332-23-A) Avail: US Patent and Trademark Office CSCL 17B

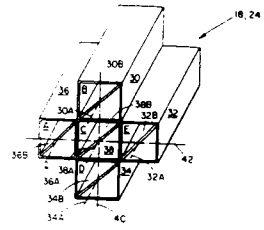
A transmitter for digital radio communication creates a null by balanced encoding of data modulated on an RF carrier, and inserts a calibration tone within the null. This is accomplished by having the calibration tone coincide in phase and frequency with the transmitted radio frequency output, for coherent demodulation of data at the receiver where the tone calibration signal is extracted and used for multipath fading compensation.

Official Gazette of the U.S. Patent and Trademark Office



N87-29718*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SWITCHED STEERABLE MULTIPLE BEAM ANTENNA SYSTEM Patent Application
RICHARD S. IWASAKI, inventor (to NASA) (Axiomatix, Los Angeles, Calif.) 10 Jun. 1987 37 p
(NASA-CASE-MSC-20873-1-SB; NAS 1.71:MSC-20873-1-SB; US-PATENT-APPL-SN-060196) Avail: NTIS HC A03/MF A01 CSCL 17B

A steerable multibeam five element cross-feed cluster antenna system is described. The feed power is divided into five branches. Each branch includes a switching network comprised of a plurality of time delay elements each individually controlled by a respective electromagnetic latching switch. Frequency independent individual two-dimensional beam steering at intermediate (IF) scanning frequencies is thereby provided wherein discrete incremental time delays are introduced by the switching networks into each branch and the signals recombined thereafter to form each beam. The electromagnetic latched switching reduces power consumption and permits higher power switching and reciprocal coincident transmit and receive operation. Frequency independence due to incremental time delay switching permits coincident reciprocal operation and steering for transmit-receive signal paths carrying different transmit-receive frequencies. Diagonal quarter wave plates in the wave guides alter polarization from the circular to orthogonal linear to provide transmitter-receiver isolation. NASA



33

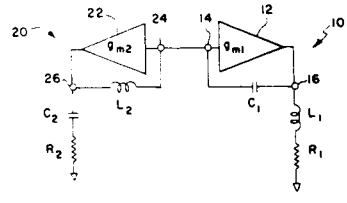
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

N87-21232* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOW PHASE NOISE OSCILLATOR USING TWO PARALLEL CONNECTED AMPLIFIERS Patent
LEONARD L. KLEINBERG 21 Apr. 1987 9 p Filed 14 May 1986 Supersedes N87-14596 (25 - 6, p 764)
(NASA-CASE-GSC-13018-1; US-PATENT-4,660,000; US-PATENT-APPL-SN-862959; US-PATENT-CLASS-331-56; US-PATENT-CLASS-331-116-R; US-PATENT-CLASS-331-117-R) Avail: US Patent and Trademark Office CSCL 09A

A high frequency oscillator is provided by connecting two amplifier circuits in parallel where each amplifier circuit provides the other amplifier circuit with the conditions necessary for oscillation. The inherent noise present in both amplifier circuits causes the quiescent current, and in turn, the generated frequency, to change. The changes in quiescent current cause the transconductance and the load impedance of each amplifier circuit to vary, and this in turn results in opposing changes in the input susceptance of each amplifier circuit. Because the changes in input susceptance oppose each other, the changes in quiescent current also oppose each other. The net result is that frequency stability is enhanced.

Official Gazette of the U.S. Patent and Trademark Office



N87-21233* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

FOUR QUADRANT CONTROL CIRCUIT FOR A BRUSHLESS THREE-PHASE DC MOTOR Patent

FRANK J. NOLA, inventor (to NASA) 17 Feb. 1987 13 p Filed 13 Sep. 1985 Supersedes N86-20682 (24 - 11, p 1765)
(NASA-CASE-MFS-28080-1; US-PATENT-4,644,234;
US-PATENT-APPL-SN-775548; US-PATENT-CLASS-318-254;
US-PATENT-CLASS-318-138; US-PATENT-CLASS-318-439)
Avail: US Patent and Trademark Office CSCL 09A

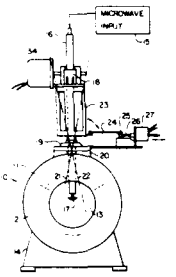
A control circuit is provided for a brushless three-phase dc motor which affords four quadrant control from a single command. The control circuit probes acceleration of the motor in both clockwise and counterclockwise directions and braking and generation in both clockwise and counterclockwise directions. In addition to turning on individual transistors of the transistor pairs connected to the phase windings of the motor for 120 deg periods while the other transistor of that pair is off, the control circuit also provides, in a future mode of operation, turning the two transistors of each pair on and off alternately at a phase modulation frequency during such a 120 deg period. A feedback signal is derived which is proportional to the motor current and which has a polarity consistent with the command signal, such that negative feedback results. Official Gazette of the U.S. Patent and Trademark Office

N87-21234* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PRECISION TUNABLE RESONANT MICROWAVE CAVITY Patent

SHIGEO NAKANISHI, inventor (to NASA), FRANK S. CALCO, inventor (to NASA), and AUGUST R. SCARPELLI, inventor (to NASA) 10 Feb. 1987 5 p Filed 11 Feb. 1985 Supersedes N85-20248 (23 - 11, p 1628)
(NASA-CASE-LEW-13935-1; US-PATENT-4,642,523;
US-PATENT-APPL-SN-700255; US-PATENT-CLASS-315-111.81;
US-PATENT-CLASS-250-423-R) Avail: US Patent and Trademark Office CSCL 09A

A tunable microwave cavity containing ionizable metallic vapor or gases and an apparatus for precisely positioning a microwave coupling tip in the cavity and for precisely adjusting at least one dimension of the cavity are disclosed. With this combined structure, resonance may be achieved with various types of ionizable gases. A coaxial probe extends into a microwave cavity through a tube. One end of the tube is retained in a spherical joint attached in the cavity wall. This allows the coaxial probe to be pivotally rotated. The coaxial probe is slideable within the tube thus allowing the probe to be extended toward or retracted from the center of the cavity. Official Gazette of the U.S. Patent and Trademark Office

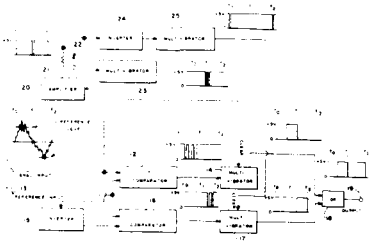


N87-21235* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

COMPARATOR WITH NOISE SUPPRESSION Patent

COLOSSIE N. BATTS, inventor (to NASA) 24 Mar. 1987 6 p Files 18 Dec. 1984 Supersedes N85-20247 (23 - 11, p 1627)
(NASA-CASE-LAR-13151-1; US-PATENT-4,652,833;
US-PATENT-APPL-SN-683101; US-PATENT-CLASS-328-147;
US-PATENT-CLASS-307-354; US-PATENT-CLASS-307-261;
US-PATENT-CLASS-328-28; US-PATENT-CLASS-328-164)
Avail: US Patent and Trademark Office CSCL 09A

An apparatus for generating a single pulse the first time only that a noisy cyclic signal exceeds a reference level during a half-cycle is disclosed. For the positive half of a cycle of the noisy cyclic signal, a comparator and a multivibrator produce a fixed voltage output when the noisy cyclic signal first exceeds the reference level. A multivibrator stops the production of the fixed voltage output when the noisy cyclic signal next passes the zero voltage level in the negative direction. Consequently, a single pulse is generated indicating that the signal exceeded the reference level during that half-cycle. The comparator and multi-vibrator produce pulses whenever the noisy cyclic signal exceeds the reference level during the negative half-cycle.
Official Gazette of the U.S. Patent and Trademark Office



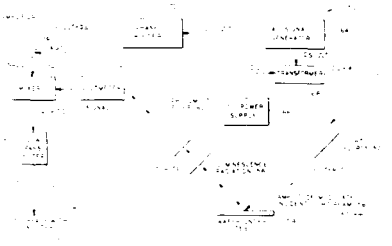
N87-22894* National Aeronautics and Space Administration. Pasadena Office, Calif.

METHOD AND APPARATUS FOR MEASURING MINORITY CARRIER LIFETIME IN A DIRECT BAND-GAP SEMICONDUCTOR Patent

OLDWIG VONROOS, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 28 Apr. 1987 12 p Filed 18 Dec. 1984 Supersedes N85-20251 (23 - 11, p 1628)
(NASA-CASE-NPO-16337-1-CU; US-PATENT-4,661,770; US-PATENT-APPL-SN-683111; US-PATENT-CLASS-324-158-D; US-PATENT-CLASS-324-158-R) Avail: US Patent and Trademark Office CSCL 09A

A direct band-gap semiconductor is exposed to intensity-modulated photon radiation having a characteristic energy at least as great as the energy gap of the semiconductor. This produces a time dependent concentration of excess charge carriers through the material, producing a luminescence signal modulated at the same frequency as the incident radiation but shifted in phase by an amount related to the lifetime of minority carriers. In a preferred embodiment, the phase shift of the luminescence signal is determined by transforming it to a modulated electrical signal and mixing the electrical signal with a reference signal modulated at the same frequency and having a phase which is known relative to the incident radiation. Minority carrier lifetime is calculated by integrating a direct current component of the mixed signal (F sub dc) over a 2 pi range in phase of the reference signal.

Official Gazette of the U.S. Patent and Trademark Office



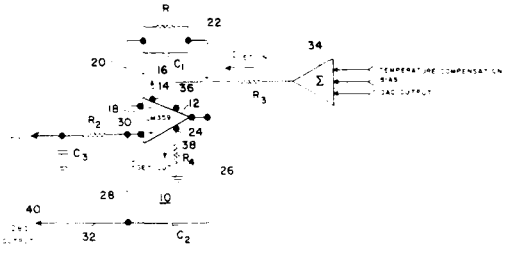
N87-22895* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

PROGRAMMABLE ELECTRONIC SYNTHESIZED CAPACITANCE Patent

LEONARD L. KLEINBERG, inventor (to NASA) 17 Feb. 1987 7 p Filed 15 Jul. 1985 Supersedes N86-20679 (24 - 11, p 1765)
(NASA-CASE-GSC-12961-1; US-PATENT-4,644,306; US-PATENT-APPL-SN-754707; US-PATENT-CLASS-333-214; US-PATENT-CLASS-307-490; US-PATENT-CLASS-330-107; US-PATENT-CLASS-330-294; US-PATENT-CLASS-331-177-R; US-PATENT-CLASS-333-217) Avail: US Patent and Trademark Office CSCL 09A

A predetermined and variable synthesized capacitance which may be incorporated into the resonant portion of an electronic oscillator for the purpose of tuning the oscillator comprises a programmable operational amplifier circuit. The operational amplifier circuit has its output connected to its inverting input, in a follower configuration, by a network which is low impedance at the operational frequency of the circuit. The output of the operational amplifier is also connected to the noninverting input by a capacitor. The noninverting input appears as a synthesized capacitance which may be varied with a variation in gain-bandwidth product of the operational amplifier circuit. The gain-bandwidth product may, in turn, be varied with a variation in input set current with a digital to analog converter whose output is varied with a command word. The output impedance of the circuit may also be varied by the output set current. This circuit may provide very small ranges in oscillator frequency with relatively large control voltages unaffected by noise.

Official Gazette of the U.S. Patent and Trademark Office



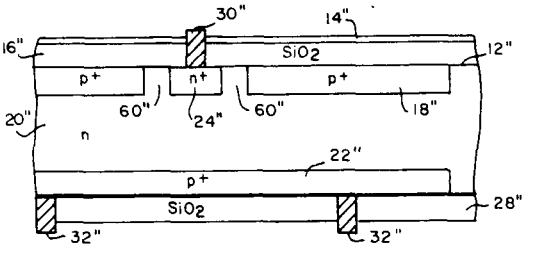
N87-23879* National Aeronautics and Space Administration. Pasadena Office, Calif.

FLOATING EMITTER SOLAR CELL Patent

SAH CHIH, inventor (to NASA) and LI-JEN CHENG, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 12 May 1987 12 p Filed 11 Mar. 1986 Supersedes N86-24908 (24 - 15, p 2450)
(NASA-CASE-NPO-16467-1-CU; US-PATENT-4,665,277; US-PATENT-APPL-SN-838648; US-PATENT-CLASS-136-255; US-PATENT-CLASS-136-249; US-PATENT-CLASS-357-30; US-PATENT-CLASS-357-35) Avail: US Patent and Trademark Office CSCL 09A

A front surface contact floating emitter solar cell transistor is provided in a semiconductor body (n-type), in which floating emitter sections (p-type) are diffused or implanted in the front surface. Between the emitter sections, a further section is diffused or implanted in the front surface, but isolated from the floating emitter sections, for use either as a base contact to the n-type semiconductor body, in which case the section is doped n+, or as a collector for the adjacent emitter sections.

Official Gazette of the U.S. Patent and Trademark Office



N87-23904* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

RECIPROCATING LINEAR MOTOR Patent

MICHAEL P. GOLDOWSKY, inventor (to NASA) (North American Philips Co., Inc., Tarrytown, N.Y.) 23 Jun. 1987 10 p Filed 17 Dec. 1985 Continuation of US-Patent-Appl-SN-437914, filed 29 Oct. 1982, abandoned

(NASA-CASE-GSC-12773-2; US-PATENT-4,675,563; US-PATENT-APPL-SN-809851; US-PATENT-CLASS-310-15; US-PATENT-CLASS-290-1-R; US-PATENT-CLASS-310-30) Avail: US Patent and Trademark Office CSCL 09A

A reciprocating linear motor is formed with a pair of ring-shaped permanent magnets having opposite radial polarizations, held axially apart by a nonmagnetic yoke, which serves as an axially displaceable armature assembly. A pair of annularly wound coils having axial lengths which differ from the axial lengths of the permanent magnets are serially coupled together in mutual opposition and positioned with an outer cylindrical core in axial symmetry about the armature assembly. One embodiment includes a second pair of annularly wound coils serially coupled together in mutual opposition and an inner cylindrical core positioned in axial symmetry inside the armature radially opposite to the first pair of coils. Application of a potential difference across a serial connection of the two pairs of coils creates a current flow perpendicular to the magnetic field created by the armature magnets, thereby causing limited linear displacement of the magnets relative to the coils.

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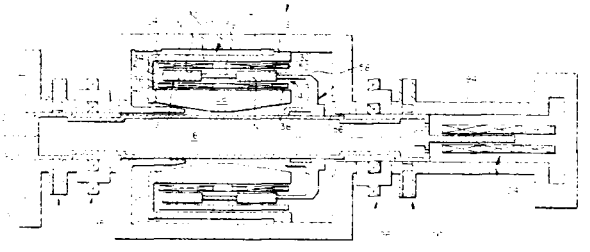


N87-25531* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

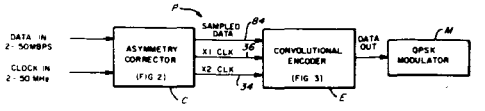
PROCESSING CIRCUIT WITH ASYMMETRY CORRECTOR AND CONVOLUTIONAL ENCODER FOR DIGITAL DATA Patent

HAROLD J. PFIFFNER, inventor (to NASA) (Hughes Aircraft Co., Culver City, Calif.) 21 Jul. 1987 11 p Filed 11 Sep. 1984 Supersedes N85-20249 (23 - 11, p 1628)

(NASA-CASE-MSC-20187-1; US-PATENT-4,682,343; US-PATENT-APPL-SN-649327; US-PATENT-CLASS-375-59; US-PATENT-CLASS-371-43; US-PATENT-CLASS-375-54; US-PATENT-CLASS-375-76; US-PATENT-CLASS-375-120) Avail: US Patent and Trademark Office CSCL 09C

A processing circuit is provided for correcting for input parameter variations, such as data and clock signal symmetry, phase offset and jitter, noise and signal amplitude, in incoming data signals. An asymmetry corrector circuit performs the correcting function and furnishes the corrected data signals to a convolutional encoder circuit. The corrector circuit further forms a regenerated clock signal from clock pulses in the incoming data signals and another clock signal at a multiple of the incoming clock signal. These clock signals are furnished to the encoder circuit so that encoded data may be furnished to a modulator at a high data rate for transmission.

Official Gazette of the U.S. Patent and Trademark Office



N87-27926*# National Aeronautics and Space Administration. Pasadena Office, Calif.

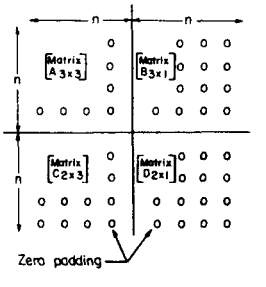
SYSTOLIC VLSI ARRAY FOR IMPLEMENTING THE KALMAN FILTER ALGORITHM Patent Application

H. G. YEH, inventor (to NASA) and J. J. CHANG, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 11 Mar. 1987 25 p

(Contract NAS7-918)

(NASA-CASE-NPO-17108-1-CU; NAS 1.71:NPO-17108-1-CU; US-PATENT-APPL-SN-032819) Avail: NTIS HC A02/MF A01 CSCL 09C

A method and apparatus for processing signals representative of a complex matrix/vector equation is disclosed and claimed. More particularly, signals representing an orderly sequence of the combined matrix and vector equation, known as a Kalman filter algorithm, is processed in real time in accordance with the principles of this invention. The Kalman filter algorithm is converted into a Faddeev algorithm, which is a matrix-only algorithm. The Faddeev algorithm is modified to represent both the matrix and vector portions of the Kalman filter algorithm. The modified Faddeev algorithm is embodied into electrical signals which are applied as inputs to a systolic array processor, which performs triangulation and nullification on the input signals, and delivers an output signal to a real-time utilization circuit. NASA



Zero padding scheme for implementing a small-size matrix/vector on a processor array.

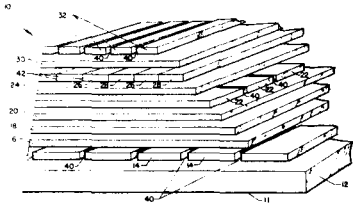
N87-28831* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

FLAT-PANEL, FULL-COLOR, ELECTROLUMINESCENT DISPLAY Patent

JAMES B. ROBERTSON, inventor (to NASA) 25 Aug. 1987 7 p Filed 3 Dec. 1985 Supersedes N86-24909 (24 - 15, p 2450) (NASA-CASE-LAR-13407-1; US-PATENT-4,689,522; US-PATENT-APPL-SN-804196; US-PATENT-CLASS-313-506; US-PATENT-CLASS-313-509; US-PATENT-CLASS-313-505) Avail: US Patent and Trademark Office CSCL 09A

This invention relates to a flat-panel, electroluminescent display capable of achieving full color and is particularly useful in achieving a bright display with high resolution. The invention uses red, green and blue phosphors in two layers separated by layers of insulating material and layers of electrodes that are used to excite the phosphors. In operation, the display is addressed by supplying sufficient voltage between selected electrodes. This places an electric field across the phosphor at each picture element located between the overlap of the selected electrodes causing the phosphor to emit light at this location. These and other matrix-addressed displays can be addressed line-at-a-time (row or column) fashion in rapid enough sequence to display information at standard TV frame rates.

Official Gazette of the U.S. Patent and Trademark Office



N87-28832* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPARATUS FOR MOUNTING A FIELD EMISSION CATHODE Patent

BEN T. EBIHARA, inventor (to NASA) and RALPH FORMAN, inventor (to NASA) 18 Aug. 1987 6 p Filed 9 May 1985 Supersedes N85-29149 (23 - 18, p 3094) (NASA-CASE-LEW-14108-1; US-PATENT-4,687,964; US-PATENT-APPL-SN-732321; US-PATENT-CLASS-313-237; US-PATENT-CLASS-313-278) Avail: US Patent and Trademark Office CSCL 09A

A field emission cathode is positioned in a pair of intersecting cross grooves, in the end of a ceramic tube by a metal end cap. A spring in electrical contact with the base of the cathode provides the necessary pressure to maintain continuous circumferential electrical contact between the gate film and a raised edge on the end cap. With this structure the cathode chip is self centering and easily replaceable. Also the gate film of the cathode is not abraded or rubbed during installation, and the holder is readily degassed.

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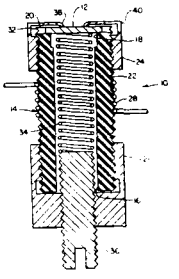


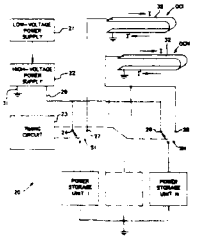
N87-28833* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ELECTRO-EXPULSIVE SEPARATION SYSTEM Patent

LEONARD A. HASLIM, inventor (to NASA) and ROBERT D. LEE, inventor (to NASA) 1 Sep. 1987 24 p Filed 31 May 1985 Supersedes N85-29150 (23 - 18, p 3094) (NASA-CASE-ARC-11613-1; US-PATENT-4,690,353; US-PATENT-APPL-SN-739792; US-PATENT-CLASS-244-134-D; US-PATENT-CLASS-318-116) Avail: US Patent and Trademark Office CSCL 09A

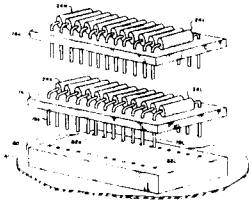
An electro-expulsive system has one or more overlapped conductors, each comprising a flexible ribbon conductor, which is folded back on itself. The conductors are embedded in an elastomeric material. Large current pulses are fed to the conductors from power storage units. As a result of the antiparallel currents, the opposed segments of a conductor are forcefully separated and the elastomeric material is distended. Voids in the elastomer aid the separation of the conductor segments. The distention is almost instantaneous when a current pulse reaches the conductor and the distention tends to remove any solid body on the surface of the elastomeric material.

Official Gazette of the U.S. Patent and Trademark Office



N87-29737*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A DIGITALLY CONTROLLED SYSTEM FOR EFFECTING AND PRESENTING A SELECTED ELECTRICAL RESISTANCE Patent Application
15 Jul. 1987 16 p
(NASA-CASE-MFS-29149-1; NAS 1.71:MFS-29149-1; US-PATENT-APPL-SN-073541) Avail: NTIS HC A02/MF A01 CSCL 09C

A digitally controlled resistance generator is described, in which resistors having values selected according to an expression 2 sup N-1 sub (R), where N is equal to the number of terms in the expression, and R is equal to the lowest value of resistance, are electrically inserted into a resistive circuit in accordance with a parallel binary signal provided by an analog-to-digital converter or a programmable computer. This binary signal is coupled via optical isolators which, when activated by a logical 1, provides a negative potential to some or all of the gate inputs of the normally on field effect transistors which, when on, shorts out the associated resistor. This applied negative potential turns the field effect transistors off and electrically inserts the resistor coupled between the source terminal and the drain terminal of that field effect transistor into the resistive circuit between the terminals. NASA



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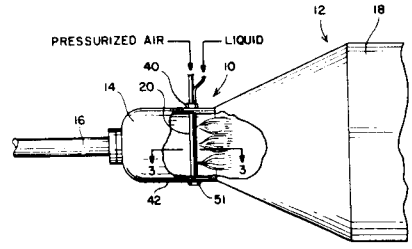
FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

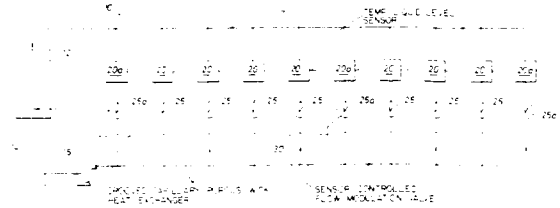
N87-21255* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIQUID SEEDING ATOMIZER Patent
HENRY L. B. SEEGMILLER, inventor (to NASA) 10 Mar. 1987 7 p Filed 31 Mar. 1986 Supersedes N86-24935 (24 - 15, p 2454)
(NASA-CASE-ARC-11631-1; US-PATENT-4,648,267; US-PATENT-APPL-SN-846428; US-PATENT-CLASS-73-147; US-PATENT-CLASS-239-426; US-PATENT-CLASS-239-434; US-PATENT-CLASS-239-545) Avail: US Patent and Trademark Office CSCL 20D

An atomizer for a liquid having an air supply is described. Liquid supply tubes extend longitudinally along the air supply tube. The air supply tube has at least one air orifice extending from an inner surface of the tube through the tube. The liquid supply tubes are positioned on either side of the air orifices and the liquid tubes are sealed to the air supply tube. The liquid supply tubes with facing liquid orifices are positioned adjacent to each of the air orifices. The liquid supply tubes are laterally spaced apart at the liquid orifices at a distance less than the diameter of the air orifices to enable a beneficial venturi effect when the atomizer is in operation.
Official Gazette of the U.S. Patent and Trademark Office



N87-22950* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PUMPED TWO-PHASE HEAT TRANSFER LOOP Patent
FRED EDELSTEIN, inventor (to NASA) (Grumman Aerospace Corp., Bethpage, N.Y.) 12 May 1987 7 p Filed 15 Jul. 1985 Supersedes N86-20721 (24 - 11, p 1771
(NASA-CASE-MSC-20841-1; US-PATENT-4,664,177; US-PATENT-APPL-SN-755288; US-PATENT-CLASS-165-1; US-PATENT-CLASS-165-34; US-PATENT-CLASS-165-104.26; US-PATENT-CLASS-165-104.25; US-PATENT-CLASS-165-104.14) Avail: US Patent and Trademark Office CSCL 20D

A pumped loop two-phase heat transfer system, operating at a nearly constant temperature throughout, includes a plurality of independently operating grooved capillary heat exchanger plates supplied with working fluid through independent flow modulation valves connected to a liquid supply line, a vapor line for collecting vapor from the heat exchangers, a condenser between the vapor and the liquid lines, and a fluid circulating pump between the condenser and the heat exchangers.
Official Gazette of the U.S. Patent and Trademark Office



N87-28867* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MONOGROOVE COLD PLATE Patent
FRED EDELSTEIN, inventor (to NASA) and RICHARD F. BROWN, inventor (to NASA) (Grumman Aerospace Corp., Bethpage, N.Y.) 18 Aug. 1987 7 p Filed 18 Jun. 1986 Supersedes N86-32661 (24 - 24, p 3724)
(NASA-CASE-MSC-20946-1; US-PATENT-4,687,048; US-PATENT-APPL-SN-875799; US-PATENT-CASE-165-1; US-PATENT-CASE-165-13; US-PATENT-CASE-165-32; US-PATENT-CASE-165-104.25; US-PATENT-CASE-165-104.26; US-PATENT-CASE-165-41) Avail: US Patent and Trademark Office CSCL 20D

The coolant fluid evaporated in a compact heat absorbing panel utilizing monogroove heat pipes in a pumped two-phase system is replenished through a liquid inlet control valve under the control of an ultrasonic liquid presence detector which is connected to the panel. The detector maintains the desired liquid quantity in the panel's liquid coolant channels, thereby dynamically responding to varying heat loads.

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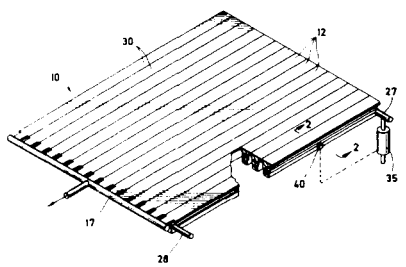
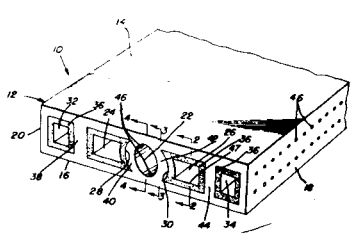


N87-29769*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CAPILLARY HEAT TRANSPORT AND FLUID MANAGEMENT DEVICE Patent Application
JAMES W. OWEN, inventor (to NASA) 30 Jun. 1987 18 p
(NASA-CASE-MFS-28217-1; NAS 1.71:MFS-28217-1; US-PATENT-APPL-SN-067844) Avail: NTIS HC A02/MF A01

A passive heat transporting and fluid management apparatus including a housing in the form of an extruded body member having flat upper and lower surfaces is disclosed. A main liquid channel and at least two vapor channels extend longitudinally through the housing from a heat input end to a heat output end. The vapor channels have sintered powdered metal fused about the peripheries to form a porous capillary wick structure. A substantial number of liquid arteries extend transversely through the wicks adjacent the respective upper and lower surfaces of the housing, the arteries extending through the wall of the housing between the vapor channels and the main liquid channel and open into the main liquid channel. Liquid from the main channel enters the artery at the heat input end, wets the wick and is vaporized. When the vapor is cooled at the heat output end, the condensed vapor refills the wick and the liquid reenters the main liquid channel. NASA



35

INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

N87-21304* National Aeronautics and Space Administration. Pasadena Office, Calif.
LOW NOISE LEAD SCREW POSITIONER Patent
GERALD S. PERKINS, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) 6 May 1986 6 p Filed 30 Jul. 1982 Supersedes N82-33681 (20 - 24, p 3437)
(NASA-CASE-NPO-15617-1; US-PATENT-4,586,394; US-PATENT-APPL-SN-403849; US-PATENT-CLASS-74-424.8-R; US-PATENT-CLASS-74-89.15; US-PATENT-CLASS-74-441; US-PATENT-CLASS-74-458; US-PATENT-CLASS-74-468) Avail: US Patent and Trademark Office CSCL 14B

A very precise and low noise lead screw positioner, for positioning a retroreflector in an interferometer is described. A gas source supplies inert pressurized gas, that flows through narrow holes into the clearance space between a nut and the lead screw. The pressurized gas keeps the nut out of contact with the screw. The gas flows axially along the clearance space, into the environment. The small amount of inert gas flowing into the environment minimizes pollution. By allowing such flow into the environment, no seals are required between the end of the nut and the screw.

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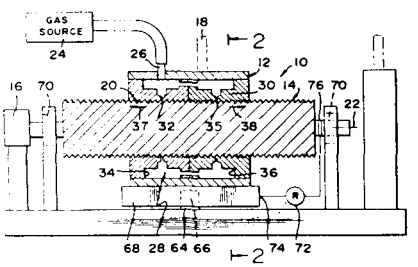

N87-22953* National Aeronautics and Space Administration. Pasadena Office, Calif.
WATER-ABSORBING CAPACITOR SYSTEM FOR MEASURING RELATIVE HUMIDITY Patent
ERIC G. LAUE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 5 May 1987 6 p Filed 20 Jun. 1985 Supersedes N86-20755 (24 - 11, p 1776)
(NASA-CASE-NPO-16544-1-CU; US-PATENT-4,662,220; US-PATENT-APPL-SN-746809; US-PATENT-CLASS-73-336.5; US-PATENT-CLASS-324-61-R) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus using a known water-absorbent polymer as a capacitor which is operated at a dc voltage for measuring relative humidity is presented. When formed as a layer between porous electrically-conductive electrodes and operated in an RC oscillator circuit, the oscillator frequency varies inversely with the partial pressure of the moisture to be measured. In a preferred embodiment, the capacitor is formed from Nafion and is operated at a low dc voltage with a resistor as an RC circuit in an RC oscillator. At the low voltage, the leakage current is proper

for oscillation over a satisfactory range. The frequency of oscillation varies in an essentially linear fashion with relative humidity which is represented by the moisture being absorbed into the Nafion. The oscillation frequency is detected by a frequency detector.

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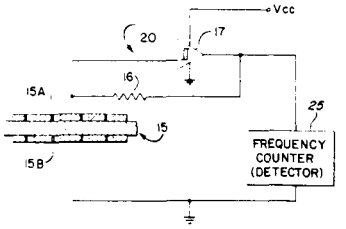


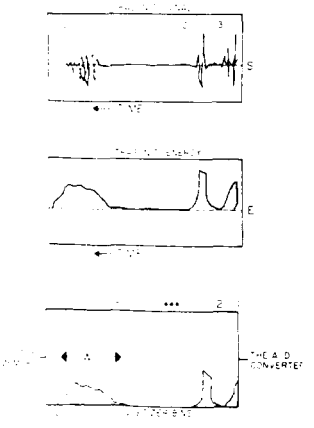
N87-23941*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

RAPID QUANTIFICATION OF AN INTERNAL PROPERTY Patent Application

JOHN COMPANION, inventor (to NASA), JOSEPH S. HEYMAN, inventor (to NASA), AL CAVALIER, inventor (to NASA), BETH MINEO, inventor (to NASA), and TRAVIS BLALOCK, inventor (to NASA) 13 Nov. 1986 19 p

(NASA-CASE-LAR-13689-1-NP; NAS 1.71:LAR-13689-1; US-PATENT-APPL-SN-929869) Avail: NTIS HC A02/MF A01 CSCL 14B

A device and method for the rapid quantification of an internal property of a material are described which are typified by embodiments for rapidly quantifying the amount of urine in the bladder of a human subject. An ultrasonic transducer, which is positioned on the subject in proximity to the bladder, is excited by a logic-controlled pulser/receiver to introduce an acoustic wave into the patient. This wave interacts with the bladder walls and is reflected back to the ultrasonic transducer, whence it is amplified and processed by the pulser/receiver. The resulting signal is digitized by an analog-to-digital converter under the command of the logic system and is stored in a memory. The software in the logic system determines the amount of urine in the bladder as a function of propagated ultrasonic energy based on programmed scientific measurements and past history of the specific subject. The system then sends out a signal to turn on any or all of the audible alarm, the visible alarm, the tactile alarm, and the remote wireless alarm. NASA



N87-23944* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

APPARATUS AD METHOD FOR QUIESCENT CONTAINERLESS PROCESSING OF HIGH TEMPERATURE METALS AND ALLOYS IN LOW GRAVITY Patent

MICHAEL B. ROBINSON, inventor (to NASA) and LEWIS L. LACY, inventor (to NASA) 30 Jun. 1987 8 p Filed 5 Dec. 1985 Supersedes N86-23899 (24 - 14, p 2285)

(NASA-CASE-MFS-28087-1; US-PATENT-4,677,642; US-PATENT-APPL-SN-805010; US-PATENT-CLASS-373-10; US-PATENT-CLASS-373-15) Avail: US Patent and Trademark Office CSCL 14B

The electron bombardment furnace consists of two confinement grid sections which may be moved and separated from each other. Inside the bombardment furnace, a tungsten element is enclosed. The material specimen is located within the tungsten element and grounded by means of grounded support wires connected to the respective sections of the furnace. The material specimen is supported on the ground wires and heated by electron bombardment until melt occurs. The furnace sections are separated in opposite directions causing the ground wires to pull from the surfaces of the specimen, leaving the specimen freely suspended in the process chamber without the action of external forces. The specimen remains in its melt condition in the processing chamber where it can be undercooled without external forces acting on the specimen, which would cause dynamic nucleation.

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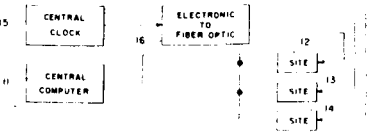
N87-24682*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

REAL-TIME SIMULATION CLOCK Patent Application

DONALD R. BENNINGTON, inventor (to NASA) and DANIEL J. CRAWFORD, inventor (to NASA) 5 Feb. 1987 12 p

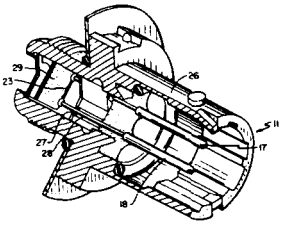
(NASA-CASE-LAR-13615-1; NAS 1.71:LAR-13615-1; US-PATENT-APPL-SN-010949) Avail: NTIS HC A02/MF A01 CSCL 14B

A real time simulation clock is decribed for generating frame tics that synchronize computations to the real time and to other computations in a system that has a central computer and multiple remote sites that utilize the central computer. Timing tics are generated with a first time interval between successive tics. Job sync tics are generated with a second time interval between successive tics. The second time interval is an exact multiple of the first time interval. A preselected frame time for each site, the timing tics and the job tics are used to generate frame tics synchronized with the job tics. NASA



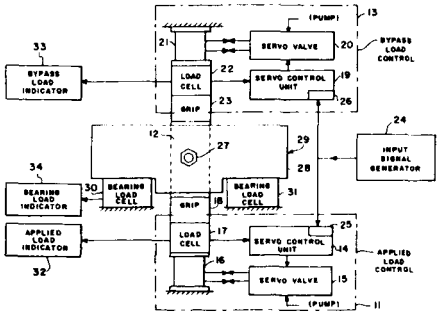
N87-25555*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FOUR-TERMINAL ELECTRICAL TESTING DEVICE Patent Application
ROBERT L. ROBINSON, inventor (to NASA), THOMAS J. GRAVES, inventor (to NASA), and WILLIAM C. HOFFMAN, III, inventor (to NASA) 1 Apr. 1987 17 p
(NASA-CASE-MSC-21166-1; US-PATENT-APPL-SN-032685)
Avail: NTIS HC A02/MF A01 CSCL 14B

The invention relates to a four-terminal electrical connector device for testing and measuring unknown resistances of initiators used for starting pyrotechnic events aboard the space shuttle. The testing device minimizes contact resistance degradation effects and so improves the reliability of resistance measurements taken with the device. Separate and independent voltage sensing and current supply circuits each include a pair of socket contacts for mating engagement with the pins of the initiator. The unknown resistance that is measured by the device is the resistance of the bridgewire of the initiator which is required to be between 0.95 and 1.15 ohms. NASA



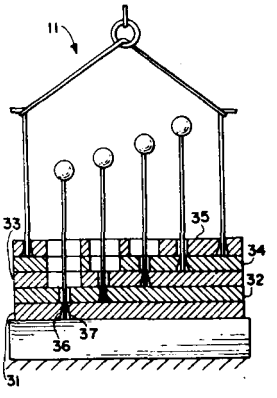
N87-25556*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BEARING BYPASS MATERIAL TESTING SYSTEM Patent Application
JOHN H. CREWS, JR., inventor (to NASA) 12 Feb. 1987 9 p
(NASA-CASE-LAR-13458-1; NAS 1.71:LAR-13458; US-PATENT-APPL-SN-013802) Avail: NTIS HC A02/MF A01 CSCL 14B

A material specimen containing a central hole is bolted between two bearing guide plates. An applied load control exerts an applied load, either tension or compression, to one end of the specimen and a bypass load control applies a bypass load to the other end of the specimen. Both load controls have their control inputs supplied by a single input signal generator. The difference between the applied load and the bypass load is transmitted through the bolt and plates to the bearing load cells. NASA



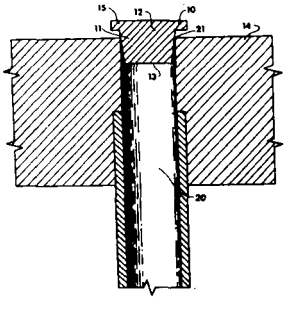
N87-25558*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MINIATURE REMOTE DEAD WEIGHT CALIBRATOR Patent Application
FRANK H. SUPPLEE, JR., inventor (to NASA) and TCHENG PING, inventor (to NASA) 30 Apr. 1987 13 p
(NASA-CASE-LAR-13564-1; US-PATENT-APPL-SN-044180)
Avail: NTIS HC A02/MF A01 CSCL 14B

The invention is a miniature, remote, computer-controlled dead weight calibrator. This device which is comprised of an interlocking rod and dead weight assembly, a motorized lifting mechanism, a controller, and a microcomputer, allows automatic calibration of force transducers needed for wind tunnel operations while the transducers are located within a cryogenic chamber. The operation of a cryogenic transonic wind tunnel requires calibration of force transducers at cryogenic operating temperatures. The invention allows remote, automatic, and sequential loading and unloading of preselected weights. NASA



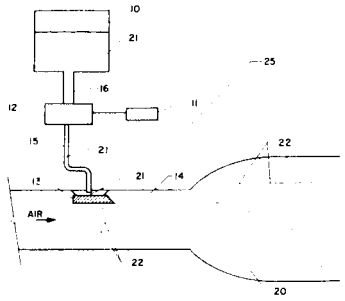
N87-25559*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POROUS PLUG FOR REDUCING ORIFICE INDUCED PRESSURE ERROR IN AIRFOILS Patent Application
ELIZABETH B. PLENTOVICH, inventor (to NASA), BLAIR B. GLOSS, inventor (to NASA), JOHN W. EVES, inventor (to NASA), and JOHN P. STACK, inventor (to NASA) 5 Feb. 1987 12 p
(NASA-CASE-LAR-13569-1; US-PATENT-APPL-SN-010943)
Avail: NTIS HC A02/MF A01 CSCL 14B

A porous plug is provided for the reduction or elimination of positive error caused by orifice during static pressure measurements of airfoils. The porous plug is press fitted into the orifice, thereby preventing the error caused either by fluid flow turning into the exposed orifice or by the fluid flow stagnating at the downstream edge of the orifice. In addition, porous plug is flushed with the outer surface of airfoil, as by filing and polishing, to provide a smooth surface which alleviates error caused by imperfections in the orifice. Porous plug is preferably made of sintered metal, which allows air to pass throught the pores, so that static pressure measurements can be made by remote transducers. NASA



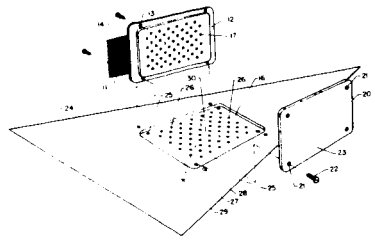
N87-25561*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VAPOR FRAGRANCER Patent Application
Q. TRAN SANG, inventor (to NASA) and TIMOTHY D. BRYANT, inventor (to NASA) 22 May 1987 9 p
(NASA-CASE-LAR-13680-1; US-PATENT-APPL-SN-052941)
Avail: NTIS HC A02/MF A01 CSCL 14B

This invention relates to a vapor fragrancer for continuously, uniformly, and economically odorizing or deodorizing an environment. Homes, offices, automobiles, and space stations require either odorizing or deodorizing of the atmosphere to create pleasant conditions for work or leisure. A vapor fragrancer is provided to accomplish these goals. A supplier continuously supplies a predetermined amount of desired liquid fragrance from a container to a retaining material, which is positioned in the circulation path of the atmosphere. The supplier is either a low powered pump or a gravity dispenser. The atmosphere flowing in a circulation path passes over the retaining material containing the liquid fragrance and lifts a fragrant vapor from the retaining material. The atmosphere is thereby continuously and uniformly fragranced. NASA



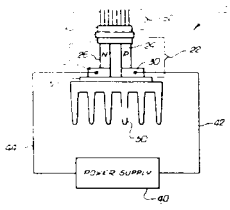
N87-28884* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVICE FOR QUICK CHANGEOVER BETWEEN WIND TUNNEL FORCE AND PRESSURE TESTING Patent
RICHARD M. WOOD, inventor (to NASA) 25 Aug. 1987 6 p
Filed 28 Aug. 1986 Supersedes N87-14675 (25 - 06, p 776)
(NASA-CASE-LAR-13512-1; US-PATENT-4,688,422;
US-PATENT-APPL-SN-901113; US-PATENT-CLASS-73-147;
US-PATENT-CLASS-73-756; US-PATENT-CLASS-285-137.1;
US-PATENT-CLASS-285-901) Avail: US Patent and Trademark Office CSCL 14B

This device allows for expeditious and repeated changeovers between pressure and force testing and which uses a minimum internal volume of a wind tunnel test structure. A matrix configuration of holes is located on the outer surface of the structure. Pressure tubes lead through the internal cavity of the structure from test sites to this outer surface matrix configuration. A pressure tube connector with a corresponding matrix of holes is connected to the surface of the structure. Pressure tubes leading from remotely located transducers are joined to the connector, thus forming pressure passageways from the test sites to the transducers to allow for pressure testing. When force testing is required, the pressure tube connector is disconnected and a cover plate is connected. The cover plate seals the exposed internal pressure tubes. Also, the outer surface of the cover plate conforms to the exterior of the structure, providing the necessary smooth surface for force testing. If further pressure testing is required, the cover plate can be disconnected and the pressure tube connector reconnected.
Official Gazette of the U.S. Patent and Trademark Office



N87-29799*# National Aeronautics and Space Administration. Pasadena Office, Calif.
THERMOCOUPLE FOR HEATING AND COOLING OF MEMORY METAL ACTUATORS Patent Application
CHARLES WOOD, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Jul. 1987 15 p
(Contract NAS7-918)
(NASA-CASE-NPO-17068-1-CU; NAS 1.71:NPO-17068-1-CU;
US-PATENT-APPL-SN-076956) Avail: NTIS HC A02/MF A01
CSCL 14B

A semiconductor thermocouple unit is provided for heating and cooling of memory metal actuators. The semiconductor thermocouple unit is mounted adjacent to a memory metal actuator and has a heat sink attached to it. A flexible thermally conductive element extends between the semiconductor thermocouple and the actuator and serves as a heat transfer medium during heating and cooling operations. NASA



36

LASERS AND MASERS

Includes parametric amplifiers.

N87-23960* National Aeronautics and Space Administration. Pasadena Office, Calif.
MEANS FOR PHASE LOCKING THE OUTPUTS OF A SURFACE EMITTING LASER DIODE ARRAY Patent
JAMES R. LESH, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 30 Jun. 1987 7 p Filed 30 Sep. 1985 Supersedes N86-20780 (24 - 11, p 1780)

(NASA-CASE-NPO-16542-1-CU; US-PATENT-4,677,629; US-PATENT-APPL-SN-781812; US-PATENT-CLASS-372-18; US-PATENT-CLASS-372-103; US-PATENT-CLASS-372-43; US-PATENT-CLASS-350-3.73; US-PATENT-CLASS-350-3.81) Avail: US Patent and Trademark Office CSCL 20E

An array of diode lasers, either a two-dimensional array of surface emitting lasers, or a linear array of stripe lasers, is phase locked by a diode laser through a hologram which focuses the output of the diode laser into a set of distinct, spatially separated beams, each one focused onto the back facet of a separate diode laser of the array. The outputs of the diode lasers thus form an emitted coherent beam out of the front of the array.

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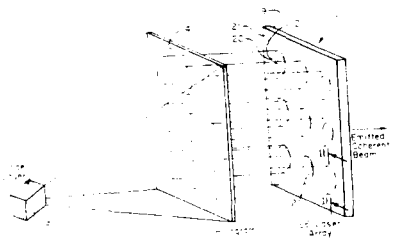

N87-23961* National Aeronautics and Space Administration. Pasadena Office, Calif.

MULTIPLEX ELECTRIC DISCHARGE GAS LASER SYSTEM Patent

JAMES B. LAUDENSLAGER, inventor (to NASA) and THOMAS J. PACALA, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 30 Jun. 1987 12 p Filed 23 Oct. 1985 Supersedes N86-20778 (24 - 11, p 1780)
(NASA-CASE-NPO-16433-1; US-PATENT-4,677,636; US-PATENT-APPL-SN-790594; US-PATENT-CLASS-372-68; US-PATENT-CLASS-372-81) Avail: US Patent and Trademark Office CSCL 20E

A multiple pulse electric discharge gas laser system is described in which a plurality of pulsed electric discharge gas lasers are supported in a common housing. Each laser is supplied with excitation pulses from a separate power supply. A controller, which may be a microprocessor, is connected to each power supply for controlling the application of excitation pulses to each laser so that the lasers can be fired simultaneously or in any desired sequence. The output light beams from the individual lasers may be combined or utilized independently, depending on the desired application. The individual lasers may include multiple pairs of discharge electrodes with a separate power supply connected across each electrode pair so that multiple light output beams can be generated from a single laser tube and combined or utilized separately.

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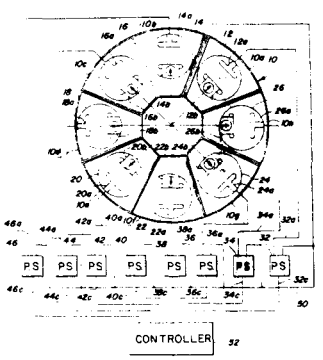

N87-25567* National Aeronautics and Space Administration. Pasadena Office, Calif.

METHOD AND MEANS FOR GENERATION OF TUNABLE LASER SIDEBANDS IN THE FAR-INFRARED REGION Patent

HERBERT M. PICKETT, inventor (to NASA) and JAM FARHOOMAND, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 21 Jul. 1987 8 p Filed 3 Oct. 1985 Supersedes N86-20779 (24 - 11, p 1780)
(NASA-CASE-NPO-16497-1-CU; US-PATENT-4,682,053; US-PATENT-APPL-SN-783887; US-PATENT-CLASS-307-425; US-PATENT-CLASS-372-4; US-PATENT-CLASS-372-20; US-PATENT-CLASS-372-69; US-PATENT-CLASS-372-99) Avail: US Patent and Trademark Office CSCL 20E

A method for generating tunable far-infrared radiation is described. The apparatus includes a Schottky-barrier diode which has one side coupled through a conductor to a waveguide that carries a tunable microwave frequency; the diode has an opposite side which is coupled through a radiating whisker to a bias source. Infrared light is directed at the diode, and infrared light with tunable sidebands is radiated by the whisker through an open space to a reflector. The original infrared is separated from a tunable infrared sideband by a polarizing Michelson interferometer.

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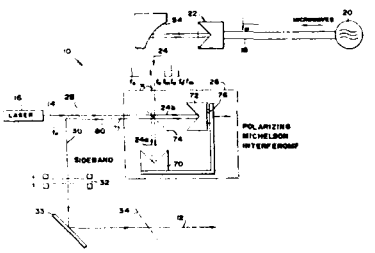


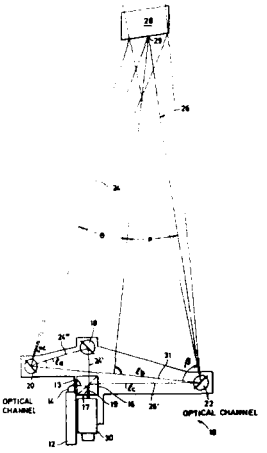
N87-25570*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RANGE AND RANGE RATE SYSTEM Patent Application

OLIN LEONARD GRAHAM, inventor (to NASA), JIM KEVIN RUSSELL, inventor (to NASA), and WALTER LANE EPPERLY, inventor (to NASA) (Westinghouse Electric Corp., Baltimore, Md.) 4 May 1987 19 p
(NASA-CASE-MSC-20867-1; NAS 1.71:MSC-20867-1; US-PATENT-APPL-SN-045984) Avail: NTIS HC A02/MF A01 CSCL 20E

A video controlled solid state range finding system which requires no radar, high power laser, or sophisticated laser target is disclosed. The effective range of the system is from 1 to about 200 feet. The system includes an opto-electric camera such as a lens/CCD array device. A helium neon laser produces a source beam of coherent light which is applied to a beam splitter. The beam splitter applies a reference beam to the camera and produces an outgoing beam applied to a first angularly variable reflector which directs the outgoing beam to the distant object. An incoming beam is reflected from the object to a second angularly variable reflector which reflects the incoming beam to the opto-electric camera via the beam splitter. The first reflector and the second reflector are configured so that the distance travelled by the outgoing beam from the beam splitter and the first reflector is the same as the distance travelled by the incoming beam from the second reflector to the beam splitter. The reference beam produces a reference signal in the geometric center of the camera. The incoming beam produces an object signal at the camera. The difference between the reference signal and the object signal is used, with manual or automatic means, to vary the angle alpha between the outgoing beam from the first reflector and the reference line between reflecting points of the first and second reflectors and the angle beta between the incoming beam from

the second reflector and the reference line. The angles alpha and beta are maintained essentially equal. The difference between the reference signal and object signal is used to provide an output to a rotator driver circuit to vary the angles of the first and second reflectors until the reference signal and object signal are coincident. Range R is then determined as R = D tan alpha. NASA



N87-28006* National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND APPARATUS FOR ENHANCING LASER ABSORPTION SENSITIVITY Patent
CHRISTOPHER R. WEBSTER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 4 Aug. 1987 15 p Filed 31 Jul. 1985 Supersedes N86-20777 (23 - 11, p 1780 (NASA-CASE-NPO-16567-1-CU; US-PATENT-4,684,258; US-PATENT-APPL-SN-760790; US-PATENT-CLASS-356-409; US-PATENT-CLASS-250-339; US-PATENT-CLASS-250-343; US-PATENT-CLASS-250-373; US-PATENT-CLASS-356-51; US-PATENT-CLASS-356-256) Avail: US Patent and Trademark Office CSCL 20E

A simple optomechanical method and apparatus is described for substantially reducing the amplitude of unwanted multiple interference fringes which often limit the sensitivities of tunable laser absorption spectrometers. An exterior cavity is defined by partially transmissible surfaces such as a laser exit plate, a detector input, etc. That cavity is spoiled by placing an oscillating plate in the laser beam. For tunable diode laser spectroscopy in the mid-infrared region, a Brewster-plate spoiler allows the harmonic detection of absorptances of less than 10 to the -5 in a single laser scan. Improved operation is achieved without subtraction techniques, without complex laser frequency modulation, and without distortion of the molecular lineshape signal. The technique is applicable to tunable lasers operating from UV to IR wavelengths and in spectrometers which employ either short or long pathlengths, including the use of retroreflectors or multipass cells.

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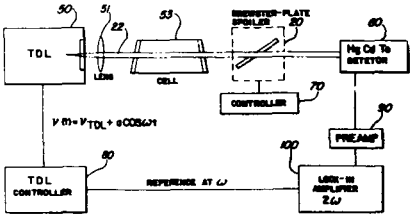

37

MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N87-21332* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DUAL MOTION VALVE WITH SINGLE MOTION INPUT Patent
ROBERT BELEW, inventor (to NASA) 14 Apr. 1987 10 p Filed 3 Jul. 1985 Supersedes N86-19611 (24 - 10, p 1583) (NASA-CASE-MFS-28058-1; US-PATENT-4,657,044; US-PATENT-APPL-SN-751691; US-PATENT-CLASS-137-606; US-PATENT-CLASS-251-165) Avail: US Patent and Trademark Office CSCL 13I

A dual motion valve includes two dual motion valve assemblies with a rotary input which allows the benefits of applying both rotary and axial motion to a rotary sealing element with a plurality of ports. The motion of the rotary sealing element during actuation provides axial engagement of the rotary sealing element with a stationary valve plate which also has ports. Fluid passages are created through the valve when the ports of the rotary sealing element are aligned with the ports of the stationary valve plate. Alignment is achieved through rotation of the rotary sealing element with respect to the stationary valve plate. The fluid passages provide direct paths which minimize fluid turbulence created in the fluid as it passes through the valve.

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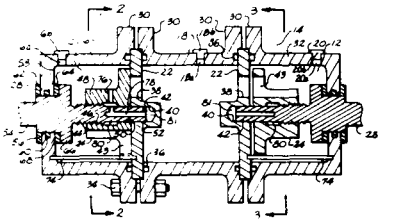

N87-21333* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF INDEXING LATCH SYSTEM Patent
JOHN C. GIBSON, inventor (to NASA), JOHN A. CALVERT, inventor (to NASA), MALCOLM F. NESMITH, inventor (to NASA), and RICHARD A. CLOYD, inventor (to NASA) 15 Apr. 1986 10 p Filed 15 Feb. 1984 Supersedes N84-20860 (22 - 11, p 1664) (NASA-CASE-MFS-25956-1; US-PATENT-4,582,289; US-PATENT-APPL-SN-580397; US-PATENT-CLASS-248-550; US-PATENT-CLASS-248-316.4) Avail: US Patent and Trademark Office CSCL 13E

A self-latching jaw assembly is described which includes a pair of jaws for latching a fitting of an associated structure such as the keel fitting of a space telescope. The jaw assembly automatically locates the fitting received on a positioning pedestal and latches it in its original location on the pedestal without need of precision alignment. The first jaw is actuated and moved to the right whereupon a reciprocating plunger, extended from the nose of the jaw senses the hub of the spool. A jaw position responsive switch is then actuated to terminate the drive motor of the jaw.

The astronaut will then actuate the drive motor of the jaw and the jaw will move to the left, whereupon the standoff will engage the face of the jaw in a latching position. In the latching position, the noses of the jaws will be under the flanges of the spool.

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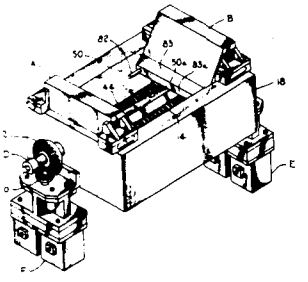

N87-21334* National Aeronautics and Space Administration. Pasadena Office, Calif.

METHOD FOR FORMING HERMETIC SEALS Patent

BRIAN D. GALLAGHER, 01inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) 17 Mar. 1987 8 p Filed 15 Aug. 1985 Supersedes N86-19610 (24 - 10, p 1583)
(NASA-CASE-NPO-16423-1-CU; US-PATENT-4,650,108; US-PATENT-APPL-SN-765978; US-PATENT-CLASS-228-124; US-PATENT-CLASS-228-209; US-PATENT-CLASS-228-208; US-PATENT-CLASS-427-229) Avail: US Patent and Trademark Office CSCL 11A

The firmly adherent film of bondable metal, such as silver, is applied to the surface of glass or other substrate by decomposing a layer of solution of a thermally decomposable metallo-organic deposition (MOD) compound such as silver neodecanoate in xylene. The MOD compound thermally decomposes into metal and gaseous by-products. Sealing is accomplished by depositing a layer of bonding metal, such as solder or a brazing alloy, on the metal film and then forming an assembly with another high melting point metal surface such as a layer of Kovar. When the assembly is heated above the temperature of the solder, the solder flows, wets the adjacent surfaces and forms a hermetic seal between the metal film and metal surface when the assembly cools.

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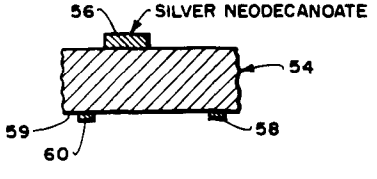

N87-22976* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

DAZE FASTENERS Patent

L. ROBERT JACKSON, inventor (to NASA), RANDALL C. DAVIS, inventor (to NASA), and ALLAN H. TAYLOR, inventor (to NASA) 17 Mar. 1987 9 p Filed 5 Feb. 1985 Division of US-Patent-4,572,699, US-Patent-Appl-SN-495380, filed 17 May 1983
(NASA-CASE-LAR-13009-2; US-PATENT-4,650,385; US-PATENT-4,572,699; US-PATENT-APPL-SN-698279; US-PATENT-APPL-SN-495380; US-PATENT-CLASS-411-166; US-PATENT-CLASS-411-368; US-PATENT-CLASS-411-424; US-PATENT-CLASS-411-427; US-PATENT-CLASS-411-531) Avail: US Patent and Trademark Office CSCL 13E

A daze fastener system for connecting two or more structural elements wherein the structural elements and fastener parts have substantially different coefficient of thermal expansion physical property characteristics is employed in this invention. By providing frusto-conical abutting surfaces between the structural elements and fastener parts any differences in thermal expansion/contraction between the parts is translated to sliding motion and avoids deleterious thermal stresses in the connection. An essential feature for isotropic homogeneous material connections is that at least two sets of mating surfaces are required wherein each set of mating surfaces has line element extensions that pass through a common point.

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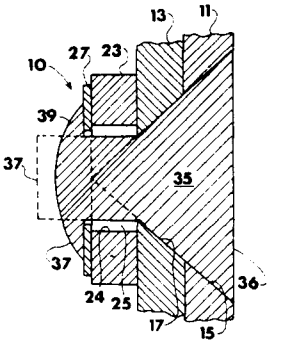

N87-22977* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

TUBE COUPLING DEVICE Patent

WILLIAM N. MYERS, inventor (to NASA) and LEOPOLD A. HEIN, inventor (to NASA) 7 May 1987 8 p Filed 10 Apr. 1986 Continuation of US-Patent-Appl-SN-692801, filed 18 Jan. 1985, abandoned
(NASA-CASE-MFS-25964-2; US-PATENT-4,655,482; US-PATENT-APPL-SN-853361; US-PATENT-APPL-SN-692801; US-PATENT-CLASS-285-81; US-PATENT-CLASS-285-85; US-PATENT-CLASS-285-91; US-PATENT-CLASS-285-305) Avail: US Patent and Trademark Office CSCL 13E

A first annular ring of a tube coupling device has a keyed opening sized to fit around the nut region of a male coupling, and a second annular ring has a keyed opening sized to fit around the nut of a female coupling. Each ring has mating ratchet teeth and these rings are biased together, thereby engaging these teeth and preventing rotation of these rings. This in turn prevents the rotation of the male nut region with respect to the female nut. For tube-to-bulkhead locking, one facet of one ring is notched, and a pin is pressed into an opening in the bulkhead. This pin is

sized to fit within one of the notches in the ring, thereby preventing rotation of this ring with respect to the bulkhead.

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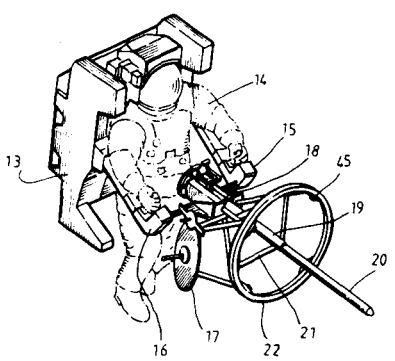
N87-22985* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

APPARATUS AND METHOD OF CAPTURING AN ORBITING SPACECRAFT Patent

WILLIAM D. HARWELL, inventors (to NASA) and DALE A. GARDNER, inventors (to NASA) 12 May 1987 13 p Filed 7 Nov. 1985 Supersedes N86-19614 (24 - 10, p 1584) (NASA-CASE-MSC-20979-1; US-PATENT-4,664,344; US-PATENT-APPL-SN-796053; US-PATENT-CLASS-244/161) Avail: US Patent and Trademark Office CSCL 13I

Apparatus and a method of capturing an orbiting spacecraft by attaching a grapple fixture are discussed. A probe is inserted into an opening, such as a rocket nozzle, in the spacecraft until a stop on the prove mechanism contacts the spacecraft. A lever is actuated releasing a spring loaded rod which moves axially along the probe removing a covering sleeve to expose spring loaded toffle fingers which pivot open engaging the side of the opening. The probe is shortened and tensioned by turning a screw thread, pressing the fingers inside of the opening to compress the spacecraft between the toggle fingers and the stop. A grapple fixture attached to the probe, which is thus secured to the spacecraft, is engaged by appropriate retrieval means such as a remote manipulator arm.

Official Gazette of the U.S. Patent and Trademark Office



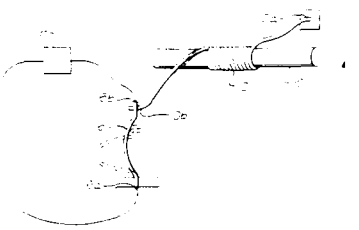
N87-23970* National Aeronautics and Space Administration. Pasadena Office, Calif.

ROTARY STEPPING DEVICE WITH MEMORY METAL ACTUATOR Patent

ROBERT S. JAMIESON, inventor (to NASA) 12 May 1987 7 p Filed 26 Aug. 1983 Supersedes N83-36484 (21 - 24, p 3978) (NASA-CASE-NPO-15482-1; US-PATENT-4,665,334; US-PATENT-APPL-SN-526739; US-PATENT-CLASS-310-306; US-PATENT-CLASS-337-393) Avail: US Patent and Trademark Office CSCL 13I

A rotary stepping device includes a rotatable shaft which is driven by means of a coiled spring clutch which is alternately tightened to grip and rotate the shaft and released to return it to a resting position. An actuator formed of a memory metal is used to pull the spring clutch to tighten it and rotate the shaft. The actuator is activated by heating it above its critical temperature and is returned to an elongated configuration by means of the force of the spring cloth.

Official Gazette of the U.S. Patent and Trademark Office



N87-23981* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD OF MAKING A FLEXIBLE DIAPHRAGM Patent

GUILLERMO LERMA, inventor (to NASA) (Rockwell International Corp., Canoga Park, Calif.) 30 Jun. 1987 8 p Filed 30 Aug. 1985 Supersedes N86-20806 (24 - 11, p 1784) (NASA-CASE-MSC-20797-1; US-PATENT-4,676,853; US-PATENT-APPL-SN-771537; US-PATENT-CLASS-156-87; US-PATENT-CLASS-156-286; US-PATENT-CLASS-156-289; US-PATENT-CLASS-156-298; US-PATENT-CLASS-156-307.1; US-PATENT-CLASS-156-307.3; US-PATENT-CLASS-156-307.7) Avail: US Patent and Trademark Office CSCL 13I

A diaphragm suitable for extreme temperature usage, such as encountered in critical aerospace applications, is fabricated by a unique method, and of a unique combination of materials, which include multilayered lay-ups of diaphragm materials sandwiched between layers of bleeder fabrics which, after being formed in the desired shape on a mold, are vacuum sealed and then cured under pressure, in a heated autoclave, to produce a bond capable of withstanding extreme temperatures.

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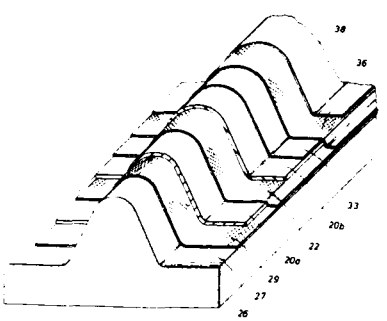

N87-23982* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADJUSTABLE MOUNT FOR ELECTRO-OPTIC TRANSDUCERS IN AN EVACUATED CRYOGENIC SYSTEM Patent
EDWARD A. CROSSLEY, JR., inventor (to NASA), DAVID P. HAYNES, inventor (to NASA), HOWARD C. JONES, inventor (to NASA), and IRBY W. JONES, inventor (to NASA) 9 Jun. 1987 10 p Filed 20 Feb. 1986 Supersedes N86-24993 (24 - 15, p 2463) (24 - 15), p 2463
(NASA-CASE-LAR-13100-1; US-PATENT-4,672,202; US-PATENT-APPL-SN-831377; US-PATENT-CLASS-250-238; US-PATENT-CLASS-250-352; US-PATENT-CLASS-62-514-R)
Avail: US Patent and Trademark Office CSCL 13I

The invention is an adjustable mount for positioning an electro-optic transducer in an evacuated cryogenic environment. Electro-optic transducers are used in this manner as high sensitivity detectors of gas emission lines of spectroscopic analysis. The mount is made up of an adjusting mechanism and a transducer mount. The adjusting mechanism provided five degrees of freedom, linear adjustments and angular adjustments. The mount allows the use of an internal lens to focus energy on the transducer element thereby improving the efficiency of the detection device. Further, the transducer mount, although attached to the adjusting mechanism, is isolated thermally such that a cryogenic environment can be maintained at the transducer while the adjusting mechanism remains at room temperature. Radiation shields also are incorporated to further reduce heat flow to the transducer location.

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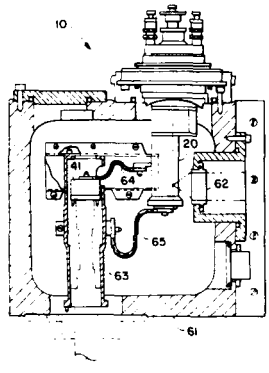

N87-23983* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FULLY REDUNDANT MECHANICAL RELEASE ACTUATOR Patent
MELVIN H. LUCY, inventor (to NASA) 2 Jun. 1987 9 p Filed 2 May 1985 Supersedes N85-29287 (23 - 18, p 3116)
(NASA-CASE-LAR-13198-1; US-PATENT-4,669,354; US-PATENT-APPL-SN-729704; US-PATENT-CLASS-89-1.14; US-PATENT-CLASS-60-634; US-PATENT-CLASS-60-638) Avail: US Patent and Trademark Office CSCL 13I

A system is described for performing a mechanical release function exhibiting low shock. This system includes two pyrotechnic detents fixed mounted in opposing axial alignment within a cylindrical housing having two mechanical bellows. Two mechanical bellow assemblies, each having one end hermetically bonded to the housing and the other to the respective actuator pin extending from either end of the housing, ensure that all outgassing and contamination from the operation of the pyrotechnic devices will be contained within the housing and bellows. The pin on one end of the assembly is fixed mounted and supported, via a bolt or ball-and-socket joint so that when the charge corresponding to that pin ignites, the entire assembly will exhibit rectilinear movement, including the opposing pin providing the unlatching motion. The release detent pin is supported by a linear bearing and when its corresponding pyrotechnic charge ignites the pin is retracted within the housing producing the same unlatching motion without movement of the entire assembly, thus providing complete mechanical, electrical and pyrotechnic redundancy for the unlatching pin.

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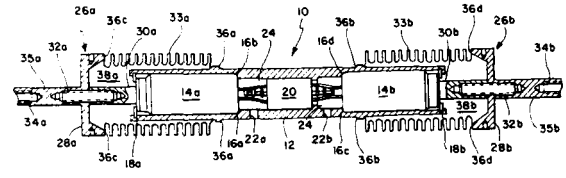
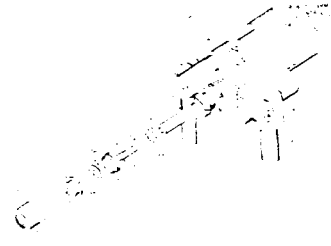


N87-24689* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REMOTELY CONTROLLED SPRAY GUN Patent
WILLIAM C. CUNNINGHAM, inventor (to NASA) (Martin Marietta Corp., Huntsville, Ala.) 19 May 1987 5 p
(NASA-CASE-MFS-28110-1; US-PATENT-4,666,086; US-PATENT-APPL-SN-852466; US-PATENT-CLASS-239-433; US-PATENT-CLASS-239-596; US-PATENT-CLASS-239-600)
Avail: US Patent and Trademark Office CSCL 13I

A remotely controlled spray gun is described in which a nozzle and orifice plate are held in precise axial alignment by an alignment member, which in turn is held in alignment with the general outlet of the spray gun by insert. By this arrangement, the precise repeatability of spray patterns is insured.

Official Gazette of the U.S. Patent and Trademark Office



N87-25573* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SELF-COMPENSATING SOLENOID VALVE Patent
FRITZ H. WOELLER, inventor (to NASA) and YUTAKA MATSUMOTO, inventor (to NASA) 21 Jul. 1987 5 p Filed 7 Nov. 1985 Supersedes N86-21859 (24 - 12, p 1956)
(NASA-CASE-ARC-11620-1; US-PATENT-4,681,142; US-PATENT-APPL-SN-795945; US-PATENT-CLASS-137-614.18; US-PATENT-CLASS-137-614.11; US-PATENT-CLASS-251-129.15; US-PATENT-CLASS-251-175) Avail: US Patent and Trademark Office CSCL 13K

A solenoid valve is described in which both an inlet and an outlet of the valve are sealed when the valve is closed. This double seal compensates for leakage at either the inlet or the outlet by making the other seal more effective in response to the leakage and allows the reversal of the flow direction by simply switching the inlet and outlet connections. The solenoid valve has a valve chamber within the valve body. Inlet and outlet tubes extend through a plate into the chamber. A movable core in the chamber extends into the solenoid coil. The distal end of the core has a silicone rubber plug. Other than when the solenoid is energized, the compressed spring biases the core downward so that the surface of the plug is in sealing engagement with the ends of the tubes. A leak at either end increases the pressure in the chamber, resulting in increased sealing force of the plug.
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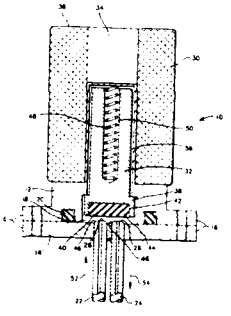
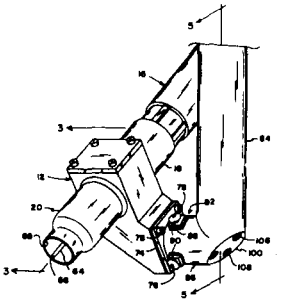


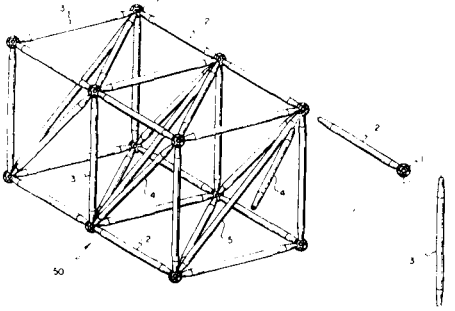
N87-25575*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A WELDING MONITORING SYSTEM Patent Application
S. G. BABCOCK, inventor (to NASA) (Rockwell International Corp., Huntsville, Ala.) 2 Feb. 1987 14 p
(NASA-CASE-MFS-29177-1; US-PATENT-APPL-SN-010942)
Avail: NTIS HC A02/MF A01 CSCL 13H

This invention relates generally to systems for remotely monitoring automatic welding operations, and more particularly to a system wherein the welder is readily positionable, while components of the optical system remain fixed. A welder having an electrode is mounted in an enclosure containing a pair of mirrors. The electrode passes through an opening in the first mirror and a gas cup. The mirror reflects an image of a welding operation taken through the opening of the gas cup to the second mirror. The second mirror then reflects the image through a rotary coupling to a third mirror which, in turn, reflects the image to a receiving lens mounted to a second rotatable coupling. The image is then projected via a fiber optic bundle to a filter unit where selected wavelengths of light are filtered from the welding image. The filter unit is coupled to an enlarger which enlarges the image and passes it to a camera. The camera is connected to an electronic eclipser which selectively darkens the brightest portions of the image. Finally, the image is recorded by a video tape recorder and displayed by a monitor. M.G.



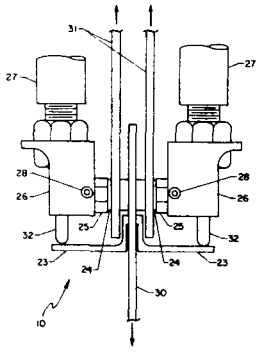
N87-25576*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COLLECT LOCK JOINT FOR SPACE STATION TRUSS Patent Application
CLARENCE J. WESSELSKI, inventor (to NASA) 1 Apr. 1987 19 p
(NASA-CASE-MSC-21207-1; US-PATENT-APPL-SN-032818)
Avail: NTIS HC A02/MF A01 CSCL 13K

A lock joint for a space station has a plurality of struts joined together in a predetermined configuration by node point fittings. The fittings have removable inserts therein. The lock joint has an elongated housing connected at one end to a strut. A split-fingered collet is mounted within the housing for movement reciprocally therein. A handle on the housing is connected to the collet for moving the collet into the insert where the fingers of the collet expand to lock the joint to the fitting. NASA



N87-25577*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNIQUE FOR MEASURING HOLE ELONGATION IN A BOLTED JOINT Patent Application
GREGORY R. WICHOREK, inventor (to NASA) 5 Feb. 1987 11 p
(NASA-CASE-LAR-13453-1; NAS 1.71:LAR-13453-1; US-PATENT-APPL-SN-010950) Avail: NTIS HC A02/MF A01 CSCL 13K

A device to determine the operable failure mode of mechanically fastened lightweight composite joints by measuring the hole elongation of a bolted joint is disclosed. The double-lap joint test apparatus comprises a stud, a test specimen having a hole, two load transfer plates, and linear displacement measuring instruments. The test specimen is sandwiched between the two load transfer plates and clamped together with the stud. Spacer washers are placed between the test specimen and each load transfer plate to provide a known, controllable area for the determination of clamping forces around the hole of the specimen attributable to bolt torque. The spacer washers also provide a gap for the mounting of reference angles on each side of the test specimen. Under tensile loading, elongation of the hole of the test specimen causes the stud to move away from the reference angles. This displacement is measured by the voltage output of two linear displacement measuring instruments that are attached to the stud and remain in contact with the reference angles throughout the tensile loading. The present invention obviates previous problems in obtaining specimen deformation measurements by mounting the reference angles to the test specimen and the linear displacement measuring instruments to the stud. NASA



N87-25582* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PRELOADABLE VECTOR SENSITIVE LATCH Patent
WILLIAM R. ACRES, inventor (to NASA) 28 Jul. 1987 13 p Filed 3 Oct. 1985 Supersedes N86-19613 (24 - 10, p 1584)
(NASA-CASE-MSC-20910-1; US-PATENT-4,682,745; US-PATENT-APPL-SN-783888; US-PATENT-CLASS-244-161; US-PATENT-CLASS-292-DIG.49; US-PATENT-CLASS-292-201; US-PATENT-CLASS-292-64) Avail: US Patent and Trademark Office CSCL 13K

A preloadable vector-sensitive latch which automatically releases when the force vector from a latch memebr reaches a specified release angle is presented. In addition, it contains means to remove clearance between the latched members and to preload the latch to prevent separation at angles less than the specified release angle. The latch comprises a triangular main link, a free link connected between a first corner of the main link and a yoke member, a housing, and an actuator connected between the yoke member and the housing. A return spring bias means connects the main link to a portion of the housing. A second corner of the main link is slidably and pivotally connected to the housing via a slot in a web portion of the housing. The latch housing has a rigid docking ring alignable with a mating locking ring which is engageable by a locking roller journalled on the third corner of the triangular main link.
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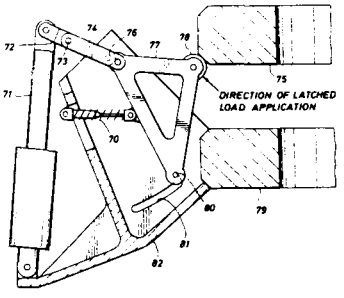
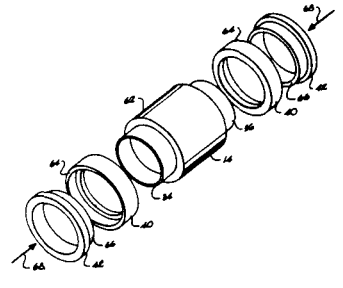


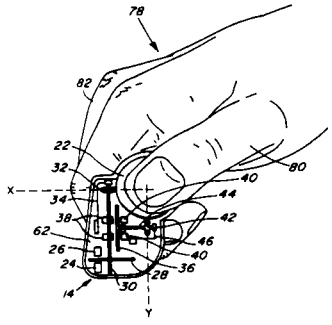
N87-25583*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
QUICK-DISCONNECT INFLATABLE SEAL ASSEMBLY Patent Application
KURT D. BUEHLER, inventor (to NASA) and JAMES E. FESMIRE, inventor (to NASA) 22 May 1987 20 p
(NASA-CASE-KSC-11368-1; US-PATENT-APPL-SN-052940)
Avail: NTIS HC A02/MF A01 CSCL 11A

The present invention concerns an inflatable seal assembly adapted for use with a bayonet quick-disconnect system particularly useful for the insulated transfer of cryogenic consumables in orbit (such as between a space station and a re-supply vehicle). The zero-leak cryogenic coupling includes a polymeric seal clamped to a male bayonet member with two pairs of tightening rings. The tightening rings threadably engage each other in respective pairs around tapered ends of the inflatable seal member so that a wedging action tightens the seal member about the male bayonet. Once in place, the seal may be inflated via an inflation port so that its expansion provides pressure contact with the inside surface of a coaxial female member. NASA



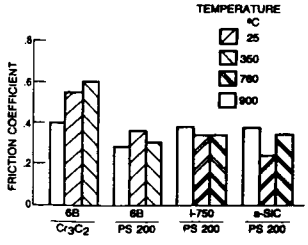
N87-25584*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AUXILIARY DATA INPUT DEVICE Patent Application
H. DOUGLAS GARNER, inventor (to NASA), ANTHONY M. BUSQUETS, inventor (to NASA), THOMAS W. HOGGE, inventor (to NASA), and RUSSELL V. PARRISH, inventor (to NASA) 18 Jun. 1987 15 p
(NASA-CASE-LAR-13626-1; US-PATENT-APPL-SN-063557)
Avail: NTIS HC A02/MF A01 CSCL 13I

an object of this invention is to provide in a control lever, a continuous, bi-coordinate, data entry device that can be manipulated by an operator's hand without the necessity of removing the hand from the control lever. The improved data entry device is provided with a handle element having a finger portion. A ball element is rotatably disposed in the finger portion and remains subject to manipulation by a single finger of the human hand grasping the handle element. The combination of drive shafts, roller elements, disk elements, light sources, and photodetection elements provide continuous output signals that describe the magnitide and direction of the ball element in two dimensions. The output signals can then be utilized, for example, to change the heading of an aircraft. NASA



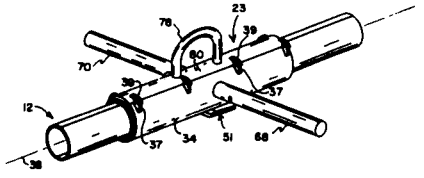
N87-25585*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CARBIDE-FLUORIDE-SILVER SELF-LUBRICATING COMPOSITE Patent Application
HAROLD E. SLINEY, inventor (to NASA) 28 May 1987 13 p
(NASA-CASE-LEW-14196-2; US-PATENT-APPL-SN-054983)
Avail: NTIS HC A02/MF A01 CSCL 11H

A self-lubricating, friction and wear reducing composite material is described for use over a wide temperature spectrum from cryogenic temperature to about 900 C in a chemically reactive environment comprising silver, barium fluoride/calcium fluoride eutectic, and metal bonded chromium carbide. NASA



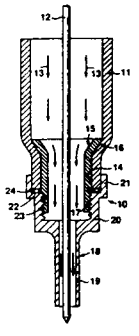
N87-25586*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BI-STEM GRIPPING APPARATUS Patent Application
FRED G. SANDERS, inventor (to NASA) 3 Jun. 1987 13 p
(NASA-CASE-MFS-28185-1; US-PATENT-APPL-SN-056930)
Avail: NTIS HC A02/MF A01 CSCL 13I

This invention relates to devices which grip cylindrical structures and more particularly to a device which has three arcuate gripping members having frictional surfaces for gripping and compressing a bi-stem. The bi-stem gripping apparatus is constructed having a pair of side gripping members, and an intermediate gripping member disposed between them. Sheets of a gum stock silicone rubber with frictional gripping surfaces are bonded to the inner region of the gripping members and provide frictional engagement between the bi-stem and the apparatus. A latch secures the gripping apparatus to a bi-stem, and removable handles are attached, allowing an astronaut to pull the bi-stem from its cassette. A tethering ring on the outside of the gripping apparatus provides a convenient point to which a lanyard may be attached. NASA



N87-25587*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WELDING TORCH GAS CUP EXTENSION Patent Application
STEPHEN S. GORDON, inventor (to NASA) (Rockwell International Corp., Huntsville, Ala.) 30 Apr. 1987 8 p
(Contract NAS8-27980)
(NASA-CASE-MFS-29252-1; US-PATENT-APPL-SN-044181)
Avail: NTIS HC A02/MF A01 CSCL 13H

The invention relates to a gas shielded electric arc welding torch having a detachable gas cup extension which may be of any desired configuration or length. The gas cup extension assembly is mounted on a standard electric welding torch gas cup to enable welding in areas with limited access. The gas cup assembly has an upper tubular insert that fits within the gas cup such that its lower portion protrudes therefrom and has a lower tubular extension that is screwed into the lower portion. The extension has a rim to define the outer perimeter of the seat edge about its entrance opening so a gasket may be placed to effect an airtight seal between the gas cup and extension. The tubular extension may be made of metal or ceramic material that can be machined. The novelty lies in the use of an extension assembly for a standard gas cup of an electric arc welding torch which extension assembly is detachable permitting the use of a number of extensions which may be of different configurations and materials and yet fit the standard gas cup. NASA



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STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

N87-25601* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FATIGUE TESTING A PLURALITY OF TEST SPECIMENS AND METHOD Patent
JAMES D. HODO, inventor (to NASA), DENNIS R. MOORE, inventor (to NASA), THOMAS F. MORRIS, inventor (to NASA), and NEWTON G. TILLER, inventor (to NASA) 30 Jun. 1987 7 p Filed 16 Jul. 1986 Supersedes N86-32770 (24 - 24, p 3740) (NASA-CASE-MFS-28118-1; US-PATENT-4,676,110; US-PATENT-APPL-SN-886121; US-PATENT-CLASS-73-809; US-PATENT-CLASS-73-810) Avail: US Patent and Trademark Office CSCL 20K

Described is a fatigue testing apparatus for simultaneously subjecting a plurality of material test specimens to cyclical tension loading to determine the fatigue strength of the material. The fatigue testing apparatus includes a pulling head having cylinders defined therein which carry reciprocating pistons. The reciprocation of the pistons is determined by cyclical supplies of pressurized fluid to the cylinders. Piston rods extend from the pistons through the pulling head and are attachable to one end of the test specimens, the other end of the test specimens being attachable to a fixed base, causing test specimens attached between the piston rods and the base to be subjected to cyclical tension loading. Because all the cylinders share a common pressurized fluid supply, the breaking of a test specimen does not substantially affect the pressure of the fluid supplied to the other cylinders nor the tension applied to the other test specimens.

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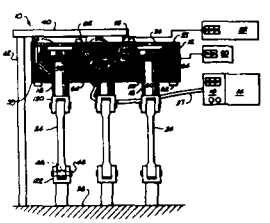

44

ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

N87-21410* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BIDIRECTIONAL CONTROL SYSTEM FOR ENERGY FLOW IN SOLAR POWERED FLYWHEEL Patent
FRANK J. NOLA, inventor (to NASA) 10 Mar. 1987 8 p Filed 31 Jul. 1984 Supersedes N84-32913 (22 - 22, p 3616) (NASA-CASE-MFS-25978-1; US-PATENT-4,649,287; US-PATENT-APPL-SN-636459; US-PATENT-CLASS-307-31; US-PATENT-CLASS-307-131; US-PATENT-CLASS-307-64; US-PATENT-CLASS-307-66; US-PATENT-CLASS-307-80; US-PATENT-CLASS-318-107; US-PATENT-CLASS-318-161) Avail: US Patent and Trademark Office CSCL 10A

An energy storage system for a spacecraft is provided which employs a solar powered flywheel arrangement including a motor/generator which, in different operating modes, drives the flywheel and is driven thereby. A control circuit, including a threshold comparator, senses the output of a solar energy converter, and when a threshold voltage is exceeded thereby indicating the availability of solar power for the spacecraft loads, activates a speed control loop including the motor/generator so as to accelerate the flywheel to a constant speed and thereby store mechanical energy, while also supplying energy from the solar converter to the loads. Under circumstances where solar energy is not available and thus the threshold voltage is not exceeded, the control circuit deactivates the speed control loop and activates a voltage control loop that provides for operation of the motor as a generator so that mechanical energy from the flywheel is converted into electrical energy for supply to the spacecraft loads.

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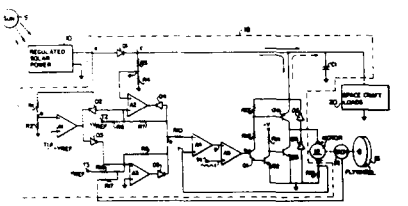
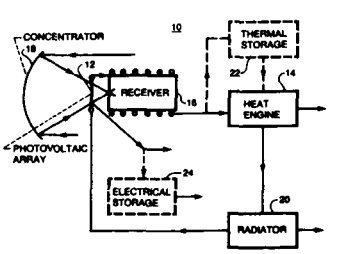


N87-25630*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBINATION PHOTOVOLTAIC-HEAT ENGINE ENERGY CONVERTER Patent Application
DONALD L. CHUBB, inventor (to NASA) 9 Jul. 1987 10 p (NASA-CASE-LEW-14252-1; US-PATENT-APPL-SN-071678) Avail: NTIS HC A02/MF A01 CSCL 10B

A combination photovoltaic array heat engine solar energy converter that converts the entire solar spectrum into electrical energy is disclosed. Photons from the solar spectrum of predetermined wavelengths are directed to the photovoltaic array and convertied to electrical energy. Also, a combination of electrical energy and thermal energy storage is provided to insure electrical power throughout the spacecraft orbit. NASA



52

AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N87-24874* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PHOTOREFRACTOR OCULAR SCREENING SYSTEM Patent
JOHN R. RICHARDSON, inventor (to NASA) and JOSEPH H. KERR, inventor (to NASA) (Medical Sciences Corp., Huntsville, Ala.) 2 Jun. 1987 11 p Filed 28 Sep. 1984 Supersedes N85-20639 (23 - 11, p 1692)
(NASA-CASE-MFS-26011-1-SB; US-PATENT-4,669,836; US-PATENT-APPL-SN-655605; US-PATENT-CLASS-351-206; US-PATENT-CLASS-354-62; US-PATENT-CLASS-351-208)
Avail: US Patent and Trademark Office CSCL 06P

A method and apparatus for detecting human eye defects, particularly detection of refractive error is presented. Eye reflex is recorded on color film when the eyes are exposed to a flash of light. The photographs are compared with predetermined standards to detect eye defects. The base structure of the ocular screening system is a folding interconnect structure, comprising hinged sections. Attached to one end of the structure is a head positioning station which comprises vertical support, a head positioning bracket having one end attached to the top of the support, and two head positioning lamps to verify precise head positioning. At the opposite end of the interconnect structure is a camera station with camera, electronic flash unit, and blinking fixation lamp, for photographing the eyes of persons being evaluated.
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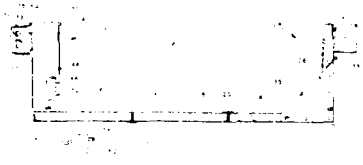


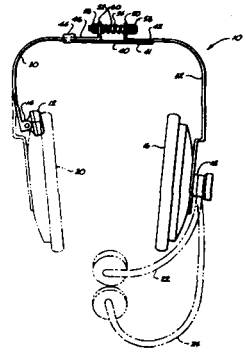
54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

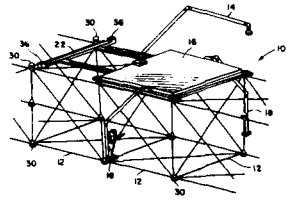
N87-25765*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
MULTI-ADJUSTABLE HEADBAND Patent Application
PIERCE C. TOOLE, inventor (to NASA), HOWARD E. CHALSON, inventor (to NASA), and WALTER S. BUSSEY, inventor (to NASA) (Planning Research Corp., Kennedy Space Center, Fla.) 8 Aug. 1986 22 p
(NASA-CASE-KSC-11322-1; US-PATENT-APPL-SN-894541)
Avail: NTIS HC A02/MF A01 CSCL 05H

This invention relates to a headband for a headset having separate coarse and fine adjustment features. The adjustments may be to the axial distance between at least one earpiece element and a side support. Such adjustment to the axial distance varies the pressure exerted on the head of the user. The present fine adjustment feature may be used while the headset is being worn, thereby permitting a user to optimize the amount of pressure between the contending criteria of comfort and keeping the headset in place on the user's head. NASA



N87-29118* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MOBILE REMOTE MANIPULATOR VEHICLE SYSTEM Patent
HAROLD G. BUSH, inventor (to NASA), MARTIN M. MIKULAS, JR., inventor (to NASA), RICHARD E. WALLSOM, inventor (to NASA), and J. KERMIT JENSEN, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) 11 Aug. 1987 17 p Filed 31 Jul. 1985 Supersedes N86-21147 (24 - 11, p 1842)
(NASA-CASE-LAR-13393-1; US-PATENT-4,685,535; US-PATENT-APPL-SN-760799; US-PATENT-CLASS-182-63; US-PATENT-CLASS-182-82; US-PATENT-CLASS-182-223)
Avail: US Patent and Trademark Office CSCL 05H

A mobile remote manipulator system is disclosed for assembly, repair and logistics transport on, around and about a space station square bay truss structure. The vehicle is supported by a square track arrangement supported by guide pins integral with the space station truss structure and located at each truss node. Propulsion is provided by a central push-pull drive mechanism that extends out from the vehicle one full structural bay over the truss and locks drive rods into the guide pins. The draw bar is now retracted and the mobile remote manipulator system is pulled onto the next adjacent structural bay. Thus, translation of the vehicle is inchworm style. The drive bar can be locked onto two guide pins while the extendable draw bar is within the vehicle and then push the vehicle away one bay providing bidirectional push-pull drive. The track switches allow the vehicle to travel in two orthogonal directions over the truss structure which coupled with the bidirectional drive, allow movement in four directions on one plane. The top layer of this trilayered vehicle is a logistics platform. This platform is capable of 369 degees of rotation and will have two astronaut foot restraint platforms and a space crane integral. NASA



60

COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

N87-21591* National Aeronautics and Space Administration. Pasadena Office, Calif.
REED-SOLOMON DECODER Patent
CHARLES R. LAHMEYER, inventor (to NASA) 10 Mar. 1987 20 p Filed 21 Nov. 1984 Supersedes N85-20680 (23 - 11, p 1699)
(NASA-CASE-NPO-15982-1; US-PATENT-4,649,541; US-PATENT-APPL-SN-673685; US-PATENT-CLASS-371-37; US-PATENT-CLASS-371-40) Avail: US Patent and Trademark Office CSCL 09B

A Reed-Solomon decoder with dedicated hardware for five sequential algorithms was designed with overall pipelining by memory swapping between input, processing and output memories, and internal pipelining through the five algorithms. The code definition used in decoding is specified by a keyword received with each block of data so that a number of different code formats may be decoded by the same hardware.

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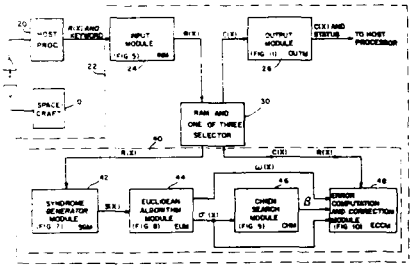


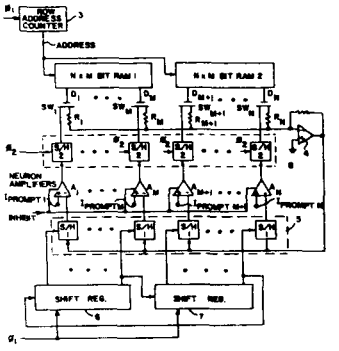
62

COMPUTER SYSTEMS

Includes computer networks.

N87-25803*# National Aeronautics and Space Administration. Pasadena Office, Calif.
HYBRID ANALOG-DIGITAL ASSOCIATIVE NEURAL NETWORK Patent Application
ALEXANDER W. MOOPENN, inventor (to NASA), ANILKUMAR THAKOOR, inventor (to NASA), and JOHN J. LAMBE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 21 May 1987 20 p
(Contract NAS7-918)
(NASA-CASE-NPO-17058-1-CU; US-PATENT-APPL-SN-060201)
Avail: NTIS HC A02/MF A01 CSCL 09B

Random access memory is used to store synaptic information in the form of a matrix of rows and columns of binary digits. N rows read in sequence are processed through switches and resistors, and a summing amplifier to N neural amplifiers in sequence, one row for each amplifier, using a first array of sample-and-hold devices S/H1 for commutation. The outputs of the neural amplifiers are stored in a second array of sample-and-hold devices S/H2 so that after N rows are processed, all of the second array of sample-and-hold devices are updated. A second memory may be added for binary values of 0 and -1, and processed simultaneously with the first to provide for values of 1, 0, and -1, the results of which are combined in a difference amplifier. NASA

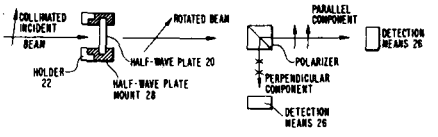


70

PHYSICS (GENERAL)

N87-25822*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEPOLARIZATION MEASUREMENT METHOD AND DEVICE Patent Application
JOSE M. ALVAREZ, inventor (to NASA) 18 Jun. 1987 16 p
(NASA-CASE-LAR-13621-1; US-PATENT-APPL-SN-063354)
Avail: NTIS HC A02/MF A01 CSCL 20C

This invention relates to a depolarization measurement method and device which employs a rotatably mounted half-wave plate to introduce a small amount of radiation from a parallel component into a perpendicular component of the depolarization device by rotating a half-wave plate by a predetermined small angle. The ratio of the outputs of a detection means, which detects the light in the parallel and perpendicular channels, is determined and a gain ratio and depolarization ratio of the detection means are simultaneously determined. The accuracy of field measurements are improved by eliminating the requirment that the depolarization device be previously calibrated at every gain possible. In addition, the device is simple to use and less time-consuming. NASA



71

ACOUSTICS

Includes sound generation, transmission, and attenuation.

N87-21652* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTIC GUIDE FOR NOISE-TRANSMISSION TESTING OF AIRCRAFT Patent
RIMAS VAICAITIS, inventor (to NASA) (Columbia Univ., New York) 24 Feb. 1987 9 p Filed 3 Jul. 1985 Supersedes N86-30086 (24 - 10, p 1663)
(NASA-CASE-LAR-13111-1-CU; US-PATENT-4,644,794; US-PATENT-APPL-SN-751695; US-PATENT-CLASS-73-583; US-PATENT-CLASS-73-589; US-PATENT-CLASS-73-599) Avail: US Patent and Trademark Office CSCL 20A

Selective testing of aircraft or other vehicular components without requiring disassembly of the vehicle or components was accomplished by using a portable guide apparatus. The device consists of a broadband noise source, a guide to direct the acoustic energy, soft sealing insulation to seal the guide to the noise source and to the vehicle component, and noise measurement microphones, both outside the vehicle at the acoustic guide output and inside the vehicle to receive attenuated sound. By directing acoustic energy only to selected components of a vehicle via the acoustic guide, it is possible to test a specific component, such as a door or window, without picking up extraneous noise which may be transmitted to the vehicle interior through other components or structure. This effect is achieved because no acoustic energy strikes the vehicle exterior except at the selected component. Also, since the test component remains attached to the vehicle, component dynamics with vehicle frame are not altered.

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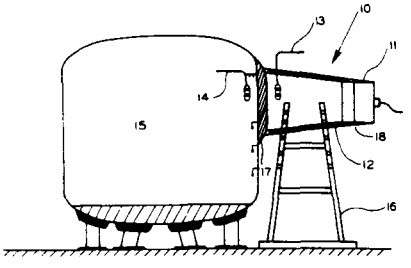

N87-21653* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTIC RADIATION STRESS MEASUREMENT Patent
JOHN H. CANTRELL, JR. and WILLIAM T. YOST 17 Mar. 1987 6 p Filed 13 Sep. 1985 Supersedes N86-22307 (24 - 12, p 2025)
(NASA-CASE-LAR-13440-1; US-PATENT-4,649,750; US-PATENT-APPL-SN-775989; US-PATENT-CLASS-73-599; US-PATENT-CLASS-73-1-DV) Avail: US Patent and Trademark Office CSCL 20A

Ultrasonic radio frequency tone-bursts are launched into a sample of material tested. The amplitude of the tone-bursts and the slope of the resulting static displacement pulses are measured. These measurements are used to calculate the nonlinearities of the materials.

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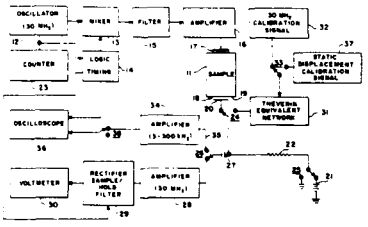

72

ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N87-21660* National Aeronautics and Space Administration. Pasadena Office, Calif.
GENERATION OF INTENSE NEGATIVE ION BEAMS Patent
ARA CHUTJIAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena), OTTO J. ORIENT, inventor (to NASA), and SAMUEL H. ALADZHADZHYAN, inventor (to NASA) 10 Mar. 1987 9 p Filed 2 May 1985 Supersedes N85-29701 (23 - 18, p 3178)
(NASA-CASE-NPO-16061-1-CU; US-PATENT-4,649,278; US-PATENT-APPL-SN-729768; US-PATENT-CLASS-250-423-R; US-PATENT-CLASS-250-424; US-PATENT-CLASS-250-427; US-PATENT-CLASS-250-288; US-PATENT-CLASS-313-359.1; US-PATENT-CLASS-313-361.1; US-PATENT-CLASS-313-362.1) Avail: US Patent and Trademark Office CSCL 20H

An electron gun is used with a mirror electrostatic field to produce zero or near zero velocity electrons by forming a turning point in their trajectories. A gas capable of attaching zero or near zero velocity is introduced at this turning point, and negative ions are produced by the attachment or dissociative attachment process. Operation may be continuous or pulsed. Ions thus formed are extracted by a simple lens system and suitable biasing of grids.

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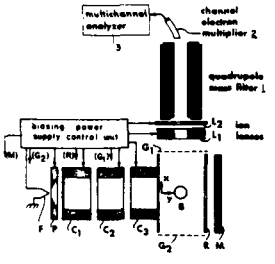

N87-21661* National Aeronautics and Space Administration. Pasadena Office, Calif.
VARIABLE ENERGY, HIGH FLUX, GROUND-STATE ATOMIC OXYGEN SOURCE Patent
ARA CHUTJIAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) and OTTO J. ORIENT, inventor (to NASA) 10 Mar. 1987 12 p Filed 10 Apr. 1986 Supersedes N86-27055 (24 - 17, p 2809)
(NASA-CASE-NPO-16640-1-CU; US-PATENT-4,649,273; US-PATENT-APPL-SN-852468; US-PATENT-CLASS-250-251; US-PATENT-CLASS-250-396-R; US-PATENT-CLASS-250-423-P; US-PATENT-CLASS-376-127) Avail: US Patent and Trademark Office CSCL 20H

A variable energy, high flux atomic oxygen source is described which is comprised of a means for producing a high density beam of molecules which will emit O(-) ions when bombarded with electrons; a means of producing a high current stream of electrons at a low energy level passing through the high density beam of molecules to produce a combined stream of electrons and O(-) ions; means for accelerating the combined stream to a desired energy level; means for producing an intense magnetic field to confine the electrons and O(-) ions; means for directing a multiple pass laser beam through the combined stream to strip off the excess electrons from a plurality of the O(-) ions to produce ground-state O atoms within the combined stream; electrostatic deflection means for deflecting the path of the O(-) ions and the electrons in the combined stream; and, means for stopping the O(-) ions and the electrons and for allowing only the ground-state O atoms to continue as the source of the atoms of interest. The method and apparatus are also adaptable for producing other ground-state atoms and/or molecules.
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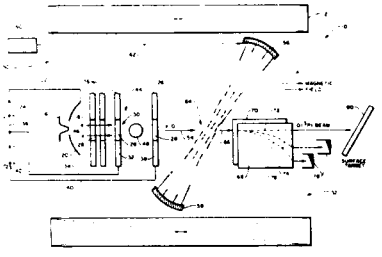
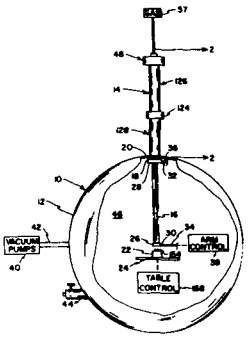


N87-25829*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ION GENERATOR AND ION APPLICATION SYSTEM Patent Application
A. P. BIDDLE, inventor (to NASA) 3 Mar. 1987 16 p
(NASA-CASE-MFS-28122-1; US-PATENT-APPL-SN-021100)
Avail: NTIS HC A02/MF A01 CSCL 20H

A vacuum chamber within which an instrument to be calibrated or tested is placed, is fitted with an ion gun having an ion source. The source has an electron emitting filament positioned adjacent to one end of an ionization chamber, with a negatively biased grid located behind the filament. Gas is injected into the source by a gas flow regulator in one end of the source. The chamber is surrounded by a plurality of independently energizable coils, with the last coil being operated at the highest current level, thus producing the highest magnetic flux. This presents a region of magnetic repulsion to the electrons produced by the filament and causes them to be confined between the grid and the region, greatly increasing the chances that an ionization collision will occur between the electrons and atoms of the injected gas. Ions are extracted from the ionization chamber by a negatively biased extractor grid positioned adjacent to an opposite end of the chamber and are collimated by a negatively biased shield grid positioned adjacent to the extractor grid. NASA



74

OPTICS

Includes light phenomena.

N87-21679* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTICAL SCANNER Patent
MITCHELL W. FINKEL, inventor (to NASA) 3 Mar. 1987 11 p Filed 2 May 1984 Supersedes N84-25450 (22 - 15, p 2407
(NASA-CASE-GSC-12897-1; US-PATENT-4,647,144; US-PATENT-APPL-SN-606432; US-PATENT-CLASS-350-6.5)
Avail: US Patent and Trademark Office CSCL 20F

An optical scanner for imaging lines in an object plane onto a linear array in a focal plane either continuously or discretely is described. The scanner consists of a set of four mutually perpendicularly oriented plane corner mirrors which provide a reflecting path that describes a parallelogram. In addition, there is a plane parallel scanning mirror with a front and back reflecting surface located midway between the first and fourth corner mirrors. It is oriented so that in the mid-scan position it is parallel to the first corner mirror, and therefore perpendicular to the fourth corner mirror. As the scan mirror rotates, rays incident from a plurality of lines in the object plane are selectively directed through the optical system arriving at a common intersection on the back surface of the scanning mirror where the rays are colinearly directed toward a lens and then imaged onto the linear array in the focal plane. A set of compensating mirrors may be introduced just before the imaging lens to compensate for a small and generally negligible path difference delta sub l between the axial and marginal rays.
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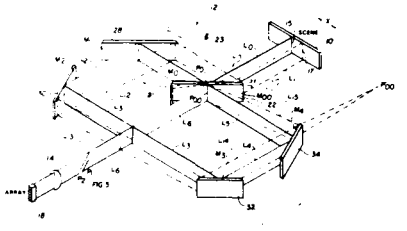

N87-23259* National Aeronautics and Space Administration. Pasadena Office, Calif.
CLOSED LOOP FIBER OPTIC ROTATION SENSOR Patent
WILLIS C. GOSS, inventor (to NASA), BRUCE R. YOUMANS, inventor (to NASA), NOBLE M. NERHEIM, inventor (to NASA), and RANDALL K. BARTMAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 5 May 1987 12 p Filed 24 Sep. 1985 Supersedes N86-20129 (24 - 10, p 1670) (NASA-CASE-NPO-16558-1-CU; US-PATENT-4,662,751; US-PATENT-APPL-SN-779744; US-PATENT-CLASS-356-350; US-PATENT-CLASS-250-231-GY) Avail: US Patent and Trademark Office CSCL 20F

An improved optical gyroscope is provided, of the type that passes two light components in opposite directions through an optic fiber coil, and which adds a small variable frequency to one of the light components to cancel the phase shift due to rotation of the coil. The amount of coil rotation from an initial orientation, is accurately determined by combining the two light components, one of which has a slightly increased frequency, to develop beats that each represent a predetermined angle of rotation. The direction of rotation is obtained by combining the two light components on a photodetector, intermittently phase shifting a single light component by 90 deg and comparing the direction of change of photodetector output (+ or -) caused by the 90 deg shift, with the slope (+ or -) of the photodetector output at about the same time, when there is a 90 deg shift.

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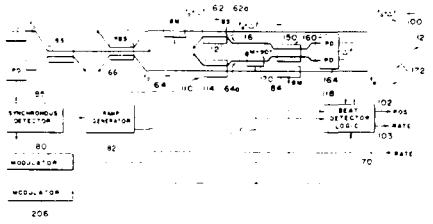
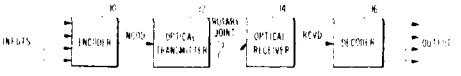


N87-24984*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTICAL DATA TRANSFER SYSTEM FOR CROSSING A ROTARY JOINT Patent Application
RICHARD J. WANGLER, inventor (to NASA) 23 Apr. 1987 19 p (NASA-CASE-LAR-13613-1-SB; NAS 1.71:LAR-13613-1-SB; US-PATENT-APPL-SN-041388) Avail: NTIS HC A02/MF A01 CSCL 20F

A data transfer system for crossing a rotary joint is described which uses optical transmitters and receivers which require no physical contact therebetween. The optical transmitter is preferably formed from an optical fiber looped around the rotation axis of the rotary joint. The optical fiber preferably has a core which produces Rayleigh scattering encased by cladding which produces MIE scattering. The light which exits the cladding of the optical fiber is detected on the opposite side of the rotary joint by a photodetector. The photodetector may receive the transmitted light via a second optical fiber having a core encased by cladding and looped around the rotation axis in a manner similar to the optical fiber in the optical transmitter. The optical transmitter preferably uses a laser as a light generating means and two-way communication is made possible by using lasers and detectors tuned to two different wavelengths and connected to opposite ends of the optical fibers in the optical transmitter and receiver.

NASA



N87-25843* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF-CLAMPING ARC LIGHT REFLECTOR FOR WELDING TORCH Patent
STEPHEN S. GORDON, inventor (to NASA) (Rockwell International Corp., Canoga Park, Calif.) 21 Jul. 1987 6 p Filed 30 Sep. 1986 SupersedesN87-15786 (25 - 7, p 961) Continuation-in-part of US-Patent-Appl-SN-783890, US-Patent-4,633,060, dated 3 Oct. 1985
(NASA-CASE-MFS-29207-1; US-PATENT-4,682,006; US-PATENT-APPL-SN-713449; US-PATENT-CLASS-219-124.34; US-PATENT-CLASS-219-74; US-PATENT-CLASS-219-130.01; US-PATENT-4,633,060; US-PATENT-APPL-SN-783890) Avail: US Patent and Trademark Office CSCL 20F

This invention is directed to a coaxial extending metal mirror reflector attached to the electrode housing or gas cup on a welding torch. An electric welding torch with an internal viewing system for robotic welding is provded with an annular arc light reflector to reflect light from the arc back onto the workpiece. The reflector has a vertical split or gap in its surrounding wall to permit the adjacent wall ends forming the split to be sprung open slightly to permit the reflector to be removed or slipped onto the torch housing or gas cup. The upper opening of the reflector is slightly smaller than the torch housing or gas cup and therefore, when placed on the torch housing or gas cup has that springiness to cause it to clamp tightly on the housing or gas cup. The split or gap also serves to permit the feed of weld wire through to the weld area,

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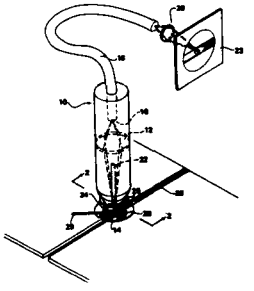

N87-28416* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHOD AND APPARATUS FOR MAKING AN OPTICAL ELEMENT HAVING A DIELECTRIC FILM Patent
GORDON C. AUGASON, *inventor* (to NASA) 4 Aug. 1987 9 p Filed 15 Aug. 1985 Supersedes N86-20128 (23 - 10, p 1670)
(NASA-CASE-ARC-11611-1; US-PATENT-4,684,424; US-PATENT-APPL-SN-765981; US-PATENT-CLASS-156-163; US-PATENT-CLASS-156-229; US-PATENT-CLASS-156-286; US-PATENT-CLASS-156-382; US-PATENT-CLASS-156-494; US-PATENT-CLASS-264-291) Avail: US Patent and Trademark Office CSCL 20F

A film-application device (FAD) comprising a pair of exterior, tapered, O-ring bearing plate members and a central plate member for simplifying the process of thermally bonding a thin dielectric film to a substrate comprising an optical element are discussed. In use, the film is sandwiched between the O rings and stretched across the optical element by squeezing the exterior plates together before bonding to the element. The film may be used for protecting the optical element or to reduce surface reflection of radiation. The FAD may also be used without the center plate to stretch a dielectric film prior to its attachment to or insertion in a holder to make pellicles or beam-splitters.

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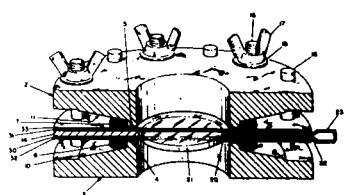

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SOLID-STATE PHYSICS

Includes superconductivity.

N87-23286* National Aeronautics and Space Administration. Pasadena Office, Calif.
TOTAL IMMERSION CRYSTAL GROWTH Patent
ANDREW D. MORRISON, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 31 Mar. 1987 9 p Filed 21 Nov. 1984 Supersedes N85-22178 (23 - 12, p 1939) Continuation-in-part of US-Patent-Appl-SN-442815, dated 18 Nov. 1982, abandoned
(NASA-CASE-NPO-15800-2; US-PATENT-4,654,110; US-PATENT-APPL-SN-674395; US-PATENT-APPL-SN-442815; US-PATENT-CLASS-156-607; US-PATENT-CLASS-156-617-H; US-PATENT-CLASS-156-617-SP) Avail: US Patent and Trademark Office CSCL 20L

Crystals of wide band gap materials are produced by positioning a holder receiving a seed crystal at the interface between a body of molten wide band gap material and an overlying layer of temperature-controlled, encapsulating liquid. The temperature of the layer decreases from the crystallization temperature of the crystal at the interface with the melt to a substantially lower temperature at which formation of crystal defects does not occur, suitably a temperature of 200 to 600 C. After initiation of crystal growth, the leading edge of the crystal is pulled through the layer until the leading edge of the crystal enters the ambient gas headspace which may also be temperature controlled. The length of the column of liquid encapsulant may exceed the length of the crystal such that the leading edge and trailing edge of the crystal are both simultaneously with the column of the crystal. The crystal can be pulled vertically by means of a pulling-rotation assembly or horizontally by means of a low-angle withdrawal mechanism.

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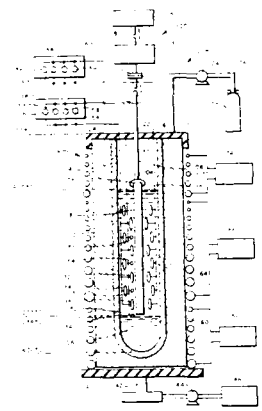

N87-25862* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LASER SCHLIEREN CRYSTAL MONITOR Patent
ROBERT B. OWEN, inventor (to NASA) and MARY H. JOHNSTON, inventor (to NASA) 21 Jul. 1987 7 p Filed 28 Feb. 1985 Supersedes N85-30932 (23 - 19, p 3374)
(NASA-CASE-MFS-28060-1; US-PATENT-4,681,437; US-PATENT-APPL-SN-706565; US-PATENT-CLASS-356-129; US-PATENT-CLASS-356-128) Avail: US Patent and Trademark Office CSCL 20B

A system and method for monitoring the state of a crystal which is suspended in a solution is described which includes providing a light source for emitting a beam of light along an optical axis. A collimating lens is arranged along the optical axis for collimating the emitted beam to provide a first collimated light beam consisting of parallel light rays. By passing the first collimated light beam through a transparent container, a number of the parallel light rays are deflected off the surfaces of said crystal being monitored according to the refractive index gradient to provide a deflected beam of deflected light rays. A focusing lens is arranged along optical axis for focusing the deflected rays towards a desired focal point. A knife edge is arranged in a predetermined orientation at the focal point; and a screen is provided. A portion of the deflected beam is blocked with the knife edge to project only a portion of the deflected beam. A band is created at one edge of the image of the crystal which indicates the state of change of the surface of the crystal being monitored.

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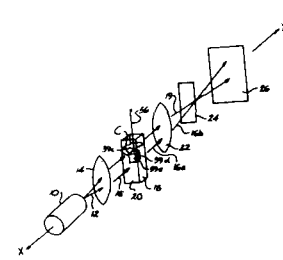
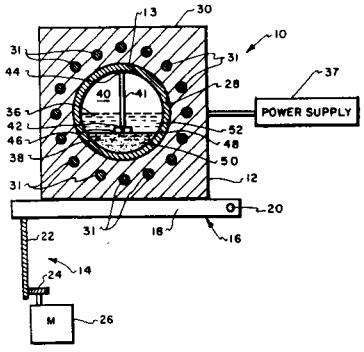


N87-25868*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIQUID ENCAPSULATED CRYSTAL GROWTH Patent Application
ANDREW D. MORRISON, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 Feb. 1987 20 p
(Contract NAS7-918)
(NASA-CASE-NPO-16808-1-CU; US-PATENT-APPL-SN-027981)
Avail: NTIS HC A02/MF A01 CSCL 20L

Low-defect crystals are grown in a closed ampoule under a layer of encapsulant. After crystal growth, the crystal is separated from the melt and moved into the layer of encapsulant and cooled to a first temperature at which crystal growth stops. The crystal is then moved into the inert gas ambient in the ampoule and further cooled. The crystal can be separated from the melt by decanting the melt into and adjacent reservoir or by rotating the ampoule to rotate the crystal into the encapsulant layer. NASA



N87-29360* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCEDURE TO PREPARE TRANSPARENT SILICA GELS Patent
PATRICK G. BARBER, inventor (to NASA) (Longwood Coll., Farmville, Va.) and NORMAN R. SIMPSON, inventor (to NASA) 29 Sep. 1987 5 p Filed 24 Nov. 1986 Supersedes N87-19115 (25 - 11, p 1527)
(NASA-CASE-LAR-13476-1-CU; US-PATENT-4,696,808; US-PATENT-APPL-SN-933961; US-PATENT-CLASS-423-338; US-PATENT-CLASS-423-339) Avail: US Patent and Trademark Office CSCL 20L

This invention relates to the production of silica gels and in particular to a process for the preparation of silica gels which can be used as a crystal growth medium that simulates the convectionless environment of space to produce structurally perfect crystals. Modern utilizations of substances in electronics, such as radio transmitters and high frequency microphones, often require single crystals with controlled purity and structural perfection. The near convectionless environment of silica gel suppresses nucleation, thereby reducing the competitive nature of crystal growth. This competition limits the size and perfection of the crystal; and it is obviously desirable to suppress nucleation until, ideally, only one crystal grows in a predetermined location. A silica gel is not a completely convectionless environment like outer space, but is the closest known environment to that of outer space that can be created on Earth.

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DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

N87-29372* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BRAILLE READING SYSTEM Patent
H. DOUGLAS GARNER, inventor (to NASA) 18 Aug. 1987 7 p Filed 31 Mar. 1986 Supersedes N86-25292 (24 - 15, p 2509)
(NASA-CASE-LAR-13306-1; US-PATENT-4,687,444; US-PATENT-APPL-SN-846430; US-PATENT-CLASS-434-114; US-PATENT-CLASS-340-407) Avail: US Patent and Trademark Office CSCL 05B

A Braille reading system wherein the display of characters is controlled by moving a position sensor is developed. A text recorded on a cassette tape is removed by a cassette player under the control of loading logic. The logic controls the cassette player to remove one or two pages of the text at a time. The removed text is stored in buffer memory. One character at a time is retrieved from memory and received by solenoid drivers. These drivers control a series of solenoids and pins to present a standard Braille representation of the character selected. The Braille display is mounted on a mouse which may be manually moved by the operator. The mouse is used to control the movement from one letter to the next.

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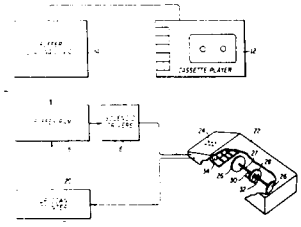

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URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

N87-21755* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PERSONNEL EMERGENCY CARRIER VEHICLE Patent
LESTER J. OWENS, inventor (to NASA) (Planning Research Corp., Kennedy Space Center, Fla.) and OTTO H. FEDOR, inventor (to

NASA) 3 Mar. 1987 8 p Filed 3 Jul. 1985 Supersedes N86-22452 (24 - 12, p 2051)
(NASA-CASE-KSC-11282-1; US-PATENT-4,646,860; US-PATENT-APPL-SN-751644; US-PATENT-CLASS-180-19.2; US-PATENT-CLASS-5-81-R; US-PATENT-CLASS-60-415; US-PATENT-CLASS-180-305; US-PATENT-CLASS-280-47.11; US-PATENT-CLASS-296-20) Avail: US Patent and Trademark Office CSCL 13F

A personnel emergency carrier vehicle is disclosed which includes a vehicle frame supported on steerable front wheels and driven rear wheels. A supply of breathing air is connected to quick connect face mask coupling and umbilical cord couplings for supplying breathing air to an injured worker or attendant either with or without a self-contained atmospheric protection suit for protection against hazardous gases at an accident site. A non-sparking hydraulic motion is utilized to drive the vehicle and suitable direction and throttling controls are provided for controlling the delivery of a hydraulic driving fluid from a pressurized hydraulic fluid accumulator. A steering axis is steerable through a handle to steer the front wheels through a linkage assembly.

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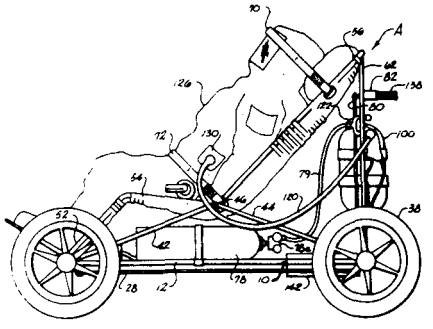

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Copies of U.S. patents may be purchased directly from the U.S. Patent and Trademark Office, Washington, D.C. 20231 at $1.50 per copy. When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02. Microfiche are sold at price code A01. The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

LICENSES FOR COMMERCIAL USE: INQUIRIES AND APPLICATIONS FOR LICENSE

NASA inventions, abstracted in *NASA PAB,* are available for nonexclusive or exclusive licensing in accordance with the NASA Patent Licensing Regulations. It is significant that all licenses for NASA inventions shall be by express written instruments and that no license will be granted or implied in a NASA invention except as provided in the NASA Patent Licensing Regulations.

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by U.S. patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the Associate General Counsel for Intellectual Property, code GP, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the U.S. Patent Number or the U.S. Application Serial Number assigned to the invention as shown in *NASA PAB.*

The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table.

STANDING ORDER SUBSCRIPTIONS

NASA SP-7039, Section 1 and its supplements are available from the National Technical Information Service (NTIS) on standing order subscription as PB 88-911100 at the price of $12.50 domestic and $25.00 foreign. Standing order subscriptions do not terminate at the end of a year, as do regular subscriptions, but continue indefinitely unless specifically terminated by the subscriber.

NASA Case Number Prefix Letters	Address of Cognizant NASA Patent Counsel
ARC-xxxxx XAR-xxxxx	Ames Research Center Mail Code: 200-11A Moffett Field, California 94035 Telephone: (415) 694-5104
ERC-xxxxx XER-xxxxx HQN-xxxxx XHQ-xxxxx	NASA Headquarters Mail Code: GP Washington, D.C. 20546 Telephone: (202) 453-2417
GSC-xxxxx XGS-xxxxx	Goddard Space Flight Center Mail Code: 204 Greenbelt, Maryland 20771 Telephone: (301) 286-7351
KSC-xxxxx XKS-xxxxx	John F. Kennedy Space Center Mail Code: PT-PAT Kennedy Space Center, Florida 32899 Telephone: (305) 867-2544
LAR-xxxxx XLA-xxxxx	Langley Research Center Mail Code: 279 Hampton, Virginia 23365 Telephone: (804) 865-3725
LEW-xxxxx XLE-xxxxx	Lewis Research Center Mail Code: 500-318 21000 Brookpark Road Cleveland, Ohio 44135 Telephone: (216) 433-5753
MSC-xxxxx XMS-xxxxx	Lyndon B. Johnson Space Center Mail Code: AL3 Houston, Texas 77058 Telephone: (713) 483-4871
MFS-xxxxx XMF-xxxxx	George C. Marshall Space Flight Center Mail Code: CC01 Huntsville, Alabama 35812 Telephone: (205) 544-0024
NPO-xxxxx XNP-xxxxx FRC-xxxxx XFR-xxxxx WOO-xxxxx	NASA Resident Legal Office Mail Code: 180-801 4800 Oak Grove Drive Pasadena, California 91103 Telephone: (818)354-2700

PATENT LICENSING REGULATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

14 CFR Part 1245

Licensing of NASA Inventions

AGENCY: National Aeronautics and Space Administration.

ACTION: Interim regulation with comments requested.

SUMMARY: The National Aeronautics and Space Administration (NASA) is revising its patent licensing regulations to conform with Pub. L. 96-517. This interim regulation provides policies and procedures applicable to the licensing of federally owned inventions in the custody of the National Aeronautics and Space Administration, and implements Pub. L. 96-517. The object of this subpart is to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

EFFECTIVE DATE: July 1, 1981. Comments must be received in writing by December 2, 1981. Unless a notice is published in the **Federal Register** after the comment period indicating changes to be made, this interim regulation shall become a final regulation.

ADDRESS: Mr. John G. Mannix, Director of Patent Licensing, GP-4, NASA, Washington, D.C. 20546.

FOR FURTHER INFORMATION CONTACT:
Mr. John G. Mannix, (202) 755-3954.

SUPPLEMENTARY INFORMATION:

PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2 of Part 1245 is revised to read as follows

• • • • •

Subpart 2—Licensing of NASA Inventions

Sec.

Authority: 35 U.S.C. Section 207 and 208, 94 Stat. 3023 and 3024.

• • • • •

Subpart 2—Licensing of NASA Inventions

§ 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions, and procedures upon which a NASA invention may be licensed. It does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts; (c) are the result of an authorized exchange of rights in the settlement of patent disputes; or (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

§ 1245.202 Definitions.

(a) "Federally owned invention" means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) "Federal agency" means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a Federally owned invention.

(c) "NASA Invention" means a Federally owned invention with respect to which NASA maintains custody and administration, in whole or in part, of the right, title, or interest in such invention on behalf of the United States Government.

(d) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(e) Practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(f) "United States" means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

§ 1245.203 Authority to grant licenses.

NASA inventions shall be made available for licensing as deemed appropriate in the public interest. NASA may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this subpart on inventions in its custody.

Restrictions and Conditions

§ 1245.204 All licenses granted under this subpart.

(a) *Restrictions.* (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) *Conditions.* Licenses shall contain such terms and conditions as NASA determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this subpart. The following terms and conditions apply to any license:

(1) The duration of the license shall be for a period specified in the license agreement, unless sooner terminated in accordance with this subpart.

(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas, or both.

(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of NASA, except to the successor of that part of the licensee's business to which the invention pertains.

(4) The license may provide the licensee the right to grant sublicenses under the license, subject to the approval of NASA. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to NASA.

(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.

(7) All licenses shall normally require royalties or other consideration.

(8) Where an agreement is obtained pursuant to § 1245.204(a)(2) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:

(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;

(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement; or

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

Types of Licenses

§ 1245.205 Nonexclusive licenses.

(a) *Availability of licenses.* Nonexclusive licenses may be granted under NASA inventions without publication of availability or notice of a prospective license.

(b) *Conditions.* In addition to the provisions of § 1245.204, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, NASA may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

§ 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on NASA inventions: (i) 3 months after notice of the invention's availability has been announced in the **Federal Register**; or (ii) without such notice where NASA determines that expeditious granting of such a license will best serve the interests of the Federal Government and the public; and (iii) in either situation, specified in (a)(1)(i) or (ii) of this section only if:

(A) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the **Federal Register**, providing opportunity for filing written objections within a 60-day period;

(B) After expiration of the period in § 1245.206(a) (1)(iii)(A) and consideration of nay written objections received during the period, NASA has determined that:

(*1*) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;

(*2*) The desired practial application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(*3*) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(*4*) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(C) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(D) NASA has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to domestic exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to NASA the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) Foreign licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on a NASA invention covered by a foreign patent, patent application, or other form of protection, provided that:

(i) Notice of a prospective license,

identifying the invention and prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections within a 60-day period and following consideration of such objections;

(ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced; and

(iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to foreign exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii) The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) *Record of determinations.* NASA shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

Procedures

§ 1245.207 Application for a license.

An application for a license should be addressed to the Patent Counsel at the NASA installation having responsibility for the invention and shall normally include:

(a) Identification of the invention for which the license is desired, including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted;

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of representative of applicant to whom correspondence should be sent;

(e) Nature and type of applicant's business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;

(f) Source of information concerning the availability of a license on the invention;

(g) A statement indicating whether applicant is a small business firm as defined in § 1245.202(c);

(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include:

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention; and

(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both;

(i) Identification of licenses previously granted to applicant under Federally owned inventions;

(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

§ 1245.208 Processing applications.

(a) Applications for licenses will be initially reviewed by the Patent Counsel of the NASA installation having responsibility for the invention. The Patent Counsel shall make a preliminary recommendation to the Director of Licensing, NASA Headquarters, whether to: (1) grant the license as requested, (2) grant the license with modification after negotiation with the licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the Federal Register in accordance with § 1245.206(a)(1)(iii)(A) or § 1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

(c) If the requested license, including any negotiated modifications, is denied by the Assistant General Counsel for Patent Matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with § 1245.211.

§ 1245.209 Notice to Attorney General.

A copy of the notice provided for in §§ 1245.206(a)(1)(iii)(A), and 1245.206(b)(1)(i) will be sent to the Attorney General.

§ 1245.210 Modification and termination of licenses.

Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicensee of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.

§ 1245.211 Appeals.

(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:

(1) A person whose application for a license has been denied;

(2) A licensee whose license has been modified or terminated, in whole or in part; or

(3) A person who timely filed a written objection in response to the notice required by §§ 1245.206(a)(1)(iii)(A) or

1245.206(b)(1)(i) and who can demonstrate to the satisfaction of NASA that such person may be damaged by the Agency action.

(b) Written notice of appeal must be filed within 30 days (or such other time as may be authorized for good cause shown) after receiving notice of the adverse decision or determination; including, an adverse decision following the request for reconsideration under § 1245.208(c). The notice of appeal, along with all supporting documentation should be addressed to the Administrator, National Aeronautics and Space Administration, Washington. DC 20546. Should the appeal raise a genuine dispute over material facts, fact-finding will be conducted by the NASA Inventions and Contributions Board. The person filing the appeal shall be afforded an opportunity to be heard and to offer evidence in support of the appeal. The Chairperson of the Inventions and Contributions Board shall prepare written findings of fact and transmit them to the Administrator or designee. The decision on the appeal shall be made by the NASA Administrator or designee. There is no further right of administrative appeal from the decision of the Administrator or designee.

§ 1245.212 Protection and administration of inventions.

NASA may take any suitable and necessary steps to protect and administer rights to NASA inventions, either directly or through contract.

§ 1245.213 Transfer of custody.

NASA having custody of certain Federally owned inventions may transfer custody and administration in whole or in part, to another Federal agency, of the right, title, or interest in any such invention.

§ 1245.214 Confidentiality of information.

Title 35, United States Code, section 209, provides that any plan submitted pursuant to § 1245.207(h) and any report required by § 1245.204(b)(6) may be treated by NASA as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

James M. Beggs,

Administrator.

October 15, 1981.

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15. Supplementary Notes

Section 1: Abstracts

16. Abstract

Abstracts are provided for 136 patents and patent applications entered into the NASA scientific and technical information system during the period July 1987 through December 1987. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.

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